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D. M. Campbell, Editor A. T. Kinsley, Associate Editor

Records of herds infected with contagious abortion in Missouri dairy herd improvement associations show that infected cows produced $40.01 less income per cow than those not infected.—*The Dairy Farmer.*

During the past year and longer the Federal Bureau of Animal Industry has studied vaccines prepared from organs and tissues of cholera infected hogs. In all, up to the present time a total of 15 lots of vaccines has been produced, using as the attenuating agents varying amounts of formaldehyde and chloroform. Considering all the work done, it seems to be established that susceptible pigs can be successfully immunized against cholera by means of vaccines attenuated through the use of formaldehyde and chloroform. The temperature at which the virus is maintained after being mixed with the attenuating agent is probably of much importance. The present indications are that an interval of from two to three weeks is required for the establishment of a satisfactory immunity in susceptible pigs treated with single doses of vaccine. The most desirable dose has not yet been established. In general, it may be stated that vaccines prepared from tissue pulp are promising, but that a considerable amount of further experimentation should be carried out before they are to be recommended for general practical use.

I believe it can safely be asserted that if we made use of the knowledge which we now have, we could add 12 years to the expectation of life of every child born in the United States.—Shirley W. Wynne, M. D.

It would appear that in the case of a number of diseases caused by filterable viruses valuable vaccines can be prepared by treating spleen pulp with formalin. Whether this is because that organ is specially rich in the virus or because it has some special action is not known, but it is certain that other virulent materials such as blood or peritoneal washings when treated with formalin are uncertain in their immunizing power, and far larger doses have to be given.—*Trop. Vet. Bul.*

Viery reports the successful use of glucose in the treatment of piroplasmosis. The glucose is dissolved in an isotonic solution. The dosage is 250 grams of glucose injected daily until at least three doses have been given. This treatment is claimed to be very effective if given in the beginning of an attack. Of over 100 cases treated, 82% recovered. Of the failures, 12% were not treated until the disease was advanced. Just why glucose is of value is not understood but this method of treatment is worthy of trial in cases of tick fever.—*Trop. Vet. Bul.*

The cost of illness every year is 15 billion dollars, not 15 million, but 15 billion dollars. Approximately 4 billion is spent for medical, surgical and nursing care and medicine, while eleven billion dollars represents the loss of wages occasioned by illness. This is a terrible price to pay for illness, but it is still more appalling to realize that the people of the United States are spending less than 0.5% to prevent this loss which they know will occur every year. There is no organization in the busines world that would not gladly spend more than 0.5% to insure itself against any loss, let alone so tremendous a one as 15 billion dollars.—Shirley W. Wynne, M. D., in *Long Island Medical Journal.*

Dr. W. S. Baer, clinical professor of orthopedic surgery at the Johns Hopkins University school of Medicine, noted while in army service that when wounded men had been lying on the ground for some time before being brought to the dressing stations, their wounds were covered with maggots (blow fly). These particular cases did not develop infection in their wounds as did those whose wounds were not infested with maggots. Upon further investigation, it was found that the maggots consumed the dead tissue and thus removed the source of food supply for septic infection. Doctor Baer has recently supplied maggots in the treatment of osteomyelitis and according to reports, the cases in which the maggots were used recovered more promptly than those cases treated without maggots. The maggots are applied immediately after operating and are believed to consume the necrotic tissue including bone thus facilitating healing.—*Science.*

It is suggested by Puntoni that the gastro-enteritis that is of relatively frequent occurrence in dogs affected with rabies is the result of the virus of rabies. It has been demonstrated that the virus is eliminated into the lumen of the bowel and it is of course possible that it is the cause of the inflammatory process.—*Trop. Vet. Bul.*

To attain the highest degree of effectiveness in his work, the research worker in the field of human medicine must be prepared to carry his investigations, if necessary, into the cow stable, the hog pen, or the hen house, and likewise so must the research worker in the field of veterinary medicine be prepared to go to the sickrooms of human beings to aid in solving the baffling problems of human disease.—J. R. Mohler.

According to experimental work done in Algeria and Argentine, it seems probable that a relatively reliable method for the immunization of cattle against anaplasmosis may be solved. It is generally conceded that blood from a bovine that has recently recovered from anaplasmosis produces a severe reaction and not infrequently the death of the animal and the blood from a bovine that had an attack of anaplasmosis 20 months or more prior to the time the blood was withdrawn will not produce a detectable reaction and therefore an immunity.

It has been demonstrated that protection or an immunity may be produced by the use of 5cc. of blood from a young bovine provided it had been injected five or six days previously with blood known to be infected with anaplasma. Perhaps the most economical source of immunizing blood is from a sheep that has previously been inoculated with anaplasma infected blood.—*Trop. Vet. Bul.*

Electrosurgery and chemical hysterectomy are recently developed procedures that may prove of very great value. Electrosurgery sterilizes the part and seals small blood and lymph vessels. Chemical hysterectomy is the removal of diseased organs or parts by chemical means. It is advised in those cases in which serious disease of the heart or other organs prohibit the usual surgical procedure.—*Science.*

Of 27,000 tubercular reacting cattle originating in New York and slaughtered at Federally inspected slaughter houses during 1926-27, approximately 900 showed lesions of the skin. The majority of cutaneous tubercular lesions occurs in the skin of the legs.—*Exp. Sta. Rec.*

The fields of human medicine and veterinary medicine have long passed the point where they are little concerned with each other—the maintenance of human health and the preservation of human life are coming to have more and more to do with the science of animal medicine.—J. R. Mohler.

The lonesome person, the thousands of roomers, those who have no family residence, are customers for dogs. A dog can give them the solace and the companionship they seek; a wagging tail and a joyous bark to greet one, gives him the feeling that there is some one who cares and that he is not alone in the world.—*Dog World.*

ARMY HEALTH REFLECTS SANITARY PROGRESS

Peace time admissions of officers and enlisted men of the United States Army to hospitals on account of illness of all kinds have declined from an annual average of 2,474 per 1,000 men during the period between the Mexican and Civil wars to 580.56 during the period of 1920 to 1928. Before the Mexican war the admission rate was 2,343 per 1,000 strength and between the Civil war and Spanish-American war it was 1,455.

"The greatest decline has been in the so-called intestinal group of diseases, the insect-borne group, venereal diseases, and such miscellaneous communicable diseases as smallpox, diphtheria, etc.

"On the other hand, there has been but little decline in the group of respiratory diseases, including influenza and pneumonia, bronchitis, common colds, etc., and these were responsible for the increase of sickness in the army during last year.

YOUR BOOKPLATE DESIRED

The illustration shows the bookplate of Doctor Volkmar of the Veterinary Department of the North Dakota Agricultural College at Fargo. Doctor Volkmar uses this plate in his veterinary books only. It was designed by Wm. Lyon, a New York artist, and of course is an allusion to the veterinary surgical operation described in Aesop's Fable "The Crane and the Wolf."

Doctor Volkmar is intensely interested in the collection of bookplates and his collection of nearly 3,000 is among the finest in the Northwest and includes the work of a wide range of American designers, early and modern French, German and English designers. Certain of the specimens date back as far as 1570.

This collection has been exhibited at a number of library association meetings and has attracted much interest.

Doctor Volkmar would like to exchange bookplates with any of the readers of VETERINARY MEDICINE who will send bookplates to him.

Nutritional Ailments of Cattle

PATIENT, scientific research during the past ten years has established definitely that there are a considerable number of substances that while not "feeds" in the sense that they are energy yielding, are still absolutely essential to the ration if the health of the animal is to be maintained. The ailments resulting from the lack of these substances have come to be called deficiency diseases, rather generally. Of these non-energy-yielding substances, the lack of which produces disease in cattle, four are recognized—calcium, phosphorus, iron and iodin. Of these, so far as is known at present, the first two are by far the more important. To ailments resulting from these mineral deficiencies must be added the deficiencies due to those little understood substances called vitamins, but while considerable research has been directed to determining the vitamin requirements of man, dogs, and laboratory animals, it is too early to assess the importance of any but the anti-rachitic vitamin, vitamin D, in the feed of cattle.

Calcium Deficiency

Calcium deficiency in cattle is almost wholly a sequel of specialized breeding, that is of high production. Obviously the intake and assimilation of a quantity of calcium that might amply suffice for a cow in the state of nature and that produced onl sufficient milk to rear her calf, might be wholly inadequate for the needs of a cow producing 10,000 pounds of milk in a year, to say nothing of the much higher production that is now common. Or an intake and assimilation of calcium sufficient for the calf that reached maturity at four to six years and weighed when mature only 600 to 700 pounds, may be inadequate for a calf that reaches that weight at one year of age.

The fact that the high-producing dairy cow and the rapidly-growing calf consumes a larger quantity of feed than the others and therefore ingests a larger quantity of calcium does not make up for the larger requirement of calcium unless there is present in the feed a sufficient quantity of vitamin D for, except in the presence of vitamin D (or ultra-violet rays), the calcium in the feed is imperfectly utilized. This vitamin is present in ample quantities in the green feed ordinarily consumed by cattle and it can be produced by the animal or a substitute for it can be produced by the animal when exposed to sufficient bright sunlight or to ultra-violet rays produced artificially. Vitamin D is apt to be deficient in the dry feed fed to cattle in the winter time. Sunlight likewise is apt to be deficient at this season and certain to be if the animals are stabled during much of the daytime. There are other factors that affect the assimilation of calcium, such as the proportion of phosphorus in the feed, the proportion of fats, and the excess of magnesium; but the effect of vitamin D and of ultra-violet light is believed to be the most important.

To accentuate the effect of low assimilation of calcium when cattle are on dry feed, the proportion of calcium is apt to be low in such feed. The concentrates in particular are very low in calcium content, and thus when a large proportion of the feed of cattle consists of cereals, the quantity of calcium in the feed, even if normally assimilated, may be inadequate for the needs of the animals.

To supply the calcium needs of the cow during the period of low calcium assimilation, nature has provided for a very considerable storage of this substance in excess of the animal's needs during the summer season or during the non-lactating season. It is obvious that the storage of a quantity of calcium that would suffice for the production of only 10 pounds of milk daily for a period of say five months, would be wholly inadequate for the production of 50 pounds of milk daily during that period. In the breeding of animals for higher milk production, no attention was given to breeding for a capacity to store up more calcium. Hence, if provision is not made for vita-

min D in the ration of the high-producing dairy cow, she may suffer from calcium deficiency, milk fever, rickets, osteoporosis, etc., even though the feed be rich in this element. An attempt has been made to supply vitamin D by the addition of codliver oil to the ration, but it was shown at the Wisconsin experiment station that this practice decreases the butter-fat yield 20%.

Phosphorus Deficiency

The phosphorus requirement of cattle is practically the same in quantity as the calcium requirement, and is affected in the same manner and to practically the same degree by breeding and selection for rapid growth and high production. Slightly less phosphorus than calcium is required for body building and slightly more for milk production. Fortunately the assimilation of phosphorus by the animal seems not to be dependent upon the presence of any vitamin, or materially affected under usual conditions by any factors other than the available quantity of it in the feed. Unlike calcium, phosphorus is present in relatively large amounts in the protein concentrates—grains; but grass, hay and other forage grown over large areas are deficient in this essential.

The areas in the United States that produce forage deficient in phosphorus appear to be few in number and limited in extent, but perhaps not all of them are recognized at the present time. The Rio Grande Valley is one of these areas where the grass is deficient in phosphorus, and certain counties of northern Wisconsin is another such area. Loin disease is common in the former and Aphosphorosis in the latter. These diseases are similar except that loin disease is complicated by the effect of toxins in rotting flesh and bones which the animals eat, and for this reason kills the animals before they have reached the extreme degrees of phosphorus deprivation observed in the Wisconsin area. Probably the climate in Wisconsin is not conducive to the formation of this toxin which accounts for Wisconsin cattle suffering from phosphorus deficiency not being affected by the toxin, for they eat bones and rotting meat, just as do the Texas cattle. The largest area in which phosphorus deficiency occurs in cattle at pasture is in South Africa. Here the disease, which as in Texas is complicated by the toxin similar to botulinus toxin produced in rotting carcasses, is called lamsietke. The addition of bone meal to the ration is an effective preventive of phosphorus deficiency. The addition of rock phosphate to the feed is inadvisable.

There are many who hold that continuous cropping of land, particularly grain farming, will sap the soil of phosphorus and lead to phosphorus deficiency in animals fed on forage grown on such land, and that therefore this particular deficiency disease will increase in importance in this country. There is no experience to confirm this conclusion. In England and in Continental Europe, on land that has been cropped for hundreds of years, aphosphorosis is unknown, while in Africa and in the Rio Grande Valley the condition has existed since the lands were first grazed by domesticated animals. On the other hand, it seems reasonable to assume that the continuous removal of grain crops high in phosphorus content such as wheat, might reduce the phosphorus in a soil already low in that element to a point where forage grown on it might be deficient in this necessary ingredient of the ration for cattle and thus increase the area in which phosphorus deficiency is a limiting factor in livestock production.

Iodin Deficiency

Iodin is required in small amounts by the animal. It is intimately associated with metabolism. Breeding and selection for increased growth and increased production probably brings with it an increased demand for iodin. Large areas in the United States are deficient in iodin, and in such areas, the lack of iodin is prone to be a limiting factor in animal production. Roughly, such areas extend along the southern boundaries of the Great Lakes and from Lake Michigan northwesterly to the Pacific coast. Throughout all of this region the effects of iodin deficiency—goitre in new-born animals, is observable. In swine production, it is of considerable importance. The loss of pigs

(hairless pigs, goitre) is very considerable. In cattle, its acute manifestations are of less importance, goitre being of much less frequent occurrence in calves than it is in pigs.

Some evidence has been adduced lately, however, to indicate that "marginal" cases of iodin deficiency may be of far more importance economically because of their more frequent occurrence, than the acute cases. Or, in other words, that it is a limiting factor of real significance, in high production and rapid growth.

Iodin deficiency is easily prevented. In the newborn it may be obviated by feeding the dam a small quantity of iodin during the period of gestation and in all animals, it may be overcome by an administration of small quantities of iodin. It cannot be administered to the suckling, however, through dam and the milk, but must be given direct.

Iron Deficiency

So far as is known, iron deficiency is not of great importance in cattle in the United States. In some sections of the world, however, (coasty disease of New Zealand) it is a real menace. Unlike phosphorus and iodin, however, the assimilation of iron is dependent upon the presence of another element—copper.

Milk is wholly deficient in copper, but young animals at birth have sufficient copper stored in their bodies to last them through a normal period of milk diet, and in calves fed for an unusually rapid growth and in calves in which milk constitutes the major portion of the diet for an abnormally long period, it is easily conceivable that the copper stored at birth might be insufficient and its exhaustion operate to bring on an anemia, unless small quantities of copper be supplied the young animal during its period of rapid growth on a principally milk diet. The amount of copper required is almost infinitesimal and of course easily supplied in various copper salts.

There is a considerable loss in young pigs from anemia and it is well to keep in mind the possibility of loss in calves from the same cause.

Vitamin Deficiency

For little more than a decade, those constituents of foods, for want of a better name, termed vitamins, have been the object of intense research. The lack of various of these constituents, termed vitamin deficiencies, have been definitely incriminated as the cause of a number of diseases in man (beri beri, pellagra, rickets) and some diseases in animals (rachitis, black tongue).

The vitamins so far discovered have been named after the letters of the alphabet and include A to H, and P-P, and perhaps some others. But little of this research has been directed to the investigation of vitamin deficiency in cattle, and so far as is known, vitamin D, the anti-rachitic vitamin, is the only one from the lack of which cattle are likely to suffer under ordinary conditions of feed and management. Vitamin D is in some way intimately associated with the assimilation of calcium, as is mentioned in the foregoing. Just how is not known.

Dietary Deficiencies and Infectious Diseases

Acute attacks of deficiency disease, although they attract the greater attention, are probably of far less importance than less marked deficiencies, that limit production, inhibit growth to a greater or less extent, and by reducing the animal's resistance, pave the way for various infections and a number of specific infectious diseases.

Experimental evidence to support this is meager as applied to cattle. Theiler in South Africa has shown that the growth of young cattle on phosphorus deficient veldt is three times as great in animals given bone meal in addition to the pasturage as it is in those subsisting on pasture alone, and the milk yield was increased 40 per cent by the same means, i.e., by supplementing the grazing with bone meal. A number of striking illustrations of the limiting effect of dietary deficiencies on the growth and production of other animals can be cited.

Considerable experimental evidence can be adduced to show that increased suscepti-

bility to infections result from dietary deficiencies insufficient in themselves to cause marked disturbances of health; but research in this field appears not to have been undertaken in cattle. Du Toit in South Africa observed that one of the most remarkable results of feeding bone meal to cattle in the phosphorus deficient area was the marked decrease in the death rate, from causes other than deficiency, as compared with the death rate in the control animals. McCulloch observed that in two tribes of natives in East Africa, one tribe whose diet consisted largely of meat and was rich in calcium and phosphorus, had a very low death rate from pneumonia and tuberculosis compared with the death rate of the other tribe whose diet consisted principally of cereals and was deficient in calcium. Orr observed a similar higher incidence of infections in sheep fed on a calcium deficient diet as compared with other sheep on the same diet and given a mineral supplement, and found lambing disease of ewes to be due to mineral deficiency. It is a common observation among veterinarians that puppies that have been fed little or no meat die from distemper at a much higher rate than puppies that have been fed properly. The onset of roup in chickens and coccidiosis in rabbits follows certain dietary deficiencies with considerable regularity.

Dietary Deficiency and Reproduction

Hart of Wisconsin found that on a ration of ground oats and oat straw cows failed to breed or give birth to dead calves. When calcium was added to this ration, the calves were born healthy. Other research workers have made similar observations in other animals, but a calcium deficiency so severe as this is not likely to occur under normal feeding conditions.

DuToit observed that the weight and vitality of calves from cows on phosphorus deficient pasturage was low, and the birth of dead calves with goitre, or the early death of those born alive with goitre, showing an iodin deficiency in the dams is common knowledge.

DeVine, from an extensive clinical experience, does not hesitate to classify certain cases of sterility in cows as being due to nutritional deficiency and prescribes no other treatment than a diet calculated to bring the animal back to a normal state of nutrition. But it is in its relation to infection of the uterus and the abortion that dietary deficiency in cattle has received the most attention.

Williams has long insisted that infectious abortion, whether due to the Bang organism or to other organisms, is largely the result of lowered resistance on the part of the dam, or to put it another way, that organisms of one kind or another, capable of producing abortion in cows are practically always present in the genital organs, and it is in an important degree only when the resistance of the animal is lowered that these organisms are able to get a start and set up inflammatory processes that result in the death and/or abortion of the fetus.

The enormous demand of the high producing dairy cow for calcium and phosphorus and the effect of the failure to supply these in needed quantities cannot be overlooked as a factor in lowering her resistance.

Peters of Illinois has collected reports on a large number of herds in which abortion was common, and in not a few cases, almost universal, and where all abortions were entirely stopped by giving mineral supplements in the diet.

The faculty that pathogenic bacteria have of rapidly mounting in virulance where transferred rapidly from one susceptible animal to another, is of course, well known, and no one would undertake to say that strains of the Bang organism and of streptococci and perhaps some other organisms do not occur capable of producing abortion in animals in no sense suffering from dietary deficiencies; but at the same time the weight of evidence is that in many instances, the field is prepared for abortion organisms by the lowered resistance in the animal that results from reproductive overload and dietary deficiency, the former probably being in no small measure dependent upon the latter.

Indigestion in Dairy Cows

By T. H. FERGUSON, Lake Geneva, Wisconsin

CATTLE practice is pretty much like any other type of veterinary practice. It is hard work to build it up and it is even harder work to keep it. It is a very exacting type of practice, but it is also a very satisfactory practice; both because of the visible results that a veterinarian may obtain, and because it is profitable to his clients. This latter, of course, makes it profitable to him.

Inappetence due to Corn Fodder

A great deal of trouble from indigestion in dairy cows occurs soon after they are put on dry feed in the fall, particularly if the hay crop is poor and much corn fodder and corn stover is fed. High producing cows fed exclusively on corn roughage, that is fodder or stover along with the silage, with the addition of some oats or other grain, frequently go off feed without apparent cause. The condition is easily remedied. Give hay. Western alfalfa seems to answer the purpose best. If the cows have not been neglected, and one is called to the case early, they recover promptly.

Impaction of the Third Stomach

Again we see a good many cows go off feed from eating frozen millet or chaff. In these the trouble is usually located in the third stomach and consists of a severe impaction. Unfortunately we get a good many of these cases too late, in our outlying practice. The dairymen in our immediate vicinity have been educated to call us early when any trouble appears in their cows, but in cases 20 or 30 miles away, and in consultation cases, we find these impactions of the third stomach that have gone along until there is complete atony of the organ.

Our treatment for these is one-half ounce of tartar emetic dissolved in two quarts of warm, soft water. Hard water won't do for this remedy. In addition to this, we give a good dose of mineral oil. Any neutral oil is satisfactory, but we prefer white rose. To this oil, we add 20 to 80 drops of croton oil. Usually about a dram.

Where sufficient catharsis is not induced by the first dose of neutral oil to which croton oil has been added, liberal quantities of neutral oil can be given later, but of course, we do not repeat the croton oil. One dose of that is sufficient.

As the condition of the rumen is always dry in these cases, we pass the stomach tube and pump in at least two pails of water, having the owner massage the rumen from the outside while we are injecting the water. We then leave a pint of some mild stomachic for the owner to give. This seems very necessary. A light ginger or capsicum tonic, of which the owner gives one ounce three or four times daily, not only helps the animal, but it goes far to prevent the owner from giving a drench now and again on his own account, a thing that is fraught with danger.

In more severe cases of this same type of indigestion the mouth will be dry as well as the contents of the rumen. In such cases, in addition to pumping a large quantity of water into the rumen, it is necessary to give a salivary stimulant. The cow will not eat or even ruminate if her mouth is dry. Pilocarpin or lobelin sulphate are convenient and effective in such cases.

In some cases, one dose of tartar emetic is not sufficient. We do not repeat it, but where further medication is needed, we resort to something else such as turpentine, ammonium carbonate or potassium chlorate, and if the case is prolonged we may give all three of them one after the other. One-half grain of eserin and one, two or three grains of pilocarpin sometimes meet the conditions splendidly. In general, I do not like giv-

ing mixtures. Give a remedy once or twice, and then if more is required, give another with a similar action. For the light stomachic tonics, alternate ginger with capsicum.

Most cases of inappetence are easy to deal with, but where it is due to impaction of the third stomach, like the cases due to eating frozen millet or large quantities of chaff, it is a very difficult condition to treat. The same result may occur from eating large quantities of any woody feed, and we frequently see it from eating too much binder twine. Cattle will eat some binder twine without harm right along, but if they get a lot of it, it is likely to become impacted in the third stomach.

Indigestion Due to Foreign Bodies

There is another type of indigestion that one sees frequently, and that is due to a foreign body. These cases recover nicely after the removal of the foreign body, provided irreparable damage has not already been done. One is apt to see these cases immediately after parturition. Possibly during parturition the foreign body is moved about and the stomach wall injured or possibly penetrated. Where the veterinarian is called upon at first appearance of indigestion, the foreign body can usually be removed before irreparable damage has been done.

In most cases of indigestion, if the animal doesn't respond from the usual treatment we suspect a foreign body, although in most instances indigestion due to a foreign body is fairly characteristic. But if recovery isn't prompt from the treatment, even where in the beginning we suspected another cause for indigestion, we do an exploratory rumenotomy.

Hoven

Sometimes in cattle fed on alfalfa, we get a dry bloat that we cannot relieve with the stomach tube and then we insert a one-inch trocar and canula. When we use the trocar and canula, we always leave the canula in place for 36 hours. This gives time for adhesion between the rumen and abdominal wall and prevents leakage onto the peritoneum, with a resultant chronic peritonitis, when the canula is removed. We usually insert the canula through a piece of thin rubber, say a section of inner tube split. Then by means of adhesive tape this rubber can be fixed solidly to the surface of the abdomen and in this way the canula can be held in place perfectly for 36 hours.

Rumenotomy

When we do a rumenotomy we always perform the operation developed by Udall. Take a rubber apron and two crochet rings of a little bit greater diameter than the length of the incision we make into the rumen. Put these rings on the rubber apron in the center and then cut out the portion within the inner ring. By squeezing the rings slightly they can be introduced into the rumen and then placed in position and pulled back tightly against the abdominal wall. They form a rubber sleeve or chute so that the hand and arm can be passed into the cavity, and the contents of the rumen removed, without the chance of contaminating surrounding tissue.

Indigestion from Salt Poisoning

Another digestive trouble of common occurrence is the result of giving salt. Farmers sometimes drench their cattle with four, five or even six pounds of salt, and when we see the animals there is a distinct salt poisoning present. The same thing happens when cattle are brought in from the pasture and given too much salt to eat, and we sometimes see it from overdoses of potassium nitrate given by the farmer. Where such cases are seen early, they respond nicely to large doses of acetic acid. We usually pass the stomach tube and pump in a gallon of vinegar, possibly more; and a little later, perhaps two gallons or even three gallons of gruel. Unless such cases are treated, they usually die.

Skin Lesions in Tuberculin Reacting Cattle*

By L. ENOS DAY, Chicago, Illinois
Pathological Laboratory, Bureau of Animal Industry, U. S. Dept. of Agri.

ALL who have examined skin lesions in cattle reacting to the tuberculin test microscopically have found acid-fast bacilli which resemble those of tuberculosis in a large percentage of cases.

In 1921 the writer examined at autopsy 85 reactors to the tuberculin test, and found skin lesions either alone or in combination with other lesions in 47 or 55.3% of them. In nine of the 47 showing skin lesions the lesions were confined to the teats. The others were located in the skin covering the legs, sides or that portion of the body which comes in contact with manure while cattle wade or lie in it.

Traum in 1916 and again in 1919 reported cases in California which, according to his description, resemble very closely those under discussion. From one of these cases he was able to procure a pure culture of acid-fast bacilli. He believed his cases to be lymphangitis in cattle caused by acid-fast bacilli. Beach and Hastings, Calmette, Carpenter and Goldberg, Marsh, and others have since called attention to skin lesions in tuberculin reacting cattle.

The percentage of skin lesions found in various parts of the country varies greatly. It ranges from 5% to 10% in some localities to as high as 50% or 60% in other localities. For personal observations made in various parts of the country I believe that the frequency varies with the sanitary condition of the premises where the cattle are kept. In one location where the reactors showed 60% of skin lesions without other lesions I found that the animals were not given any bedding to lie on in the stalls. The manure from the stalls was shoveled out into the barnyard where it was allowed to accumulate for many months, making it necessary for the cattle to wade through this manure on entering and leaving the stalls. Naturally, under these conditions, the legs and parts of the body that come in contact with the ground while lying down soon become heavily caked with manure. It is my belief that such accumulation of manure on the skin produce irritation and inflammation which lead to the formation of fissures in the skin through which tubercle bacilli gain entrance from infected manure.

Skin lesions of tuberculosis are found not only in tuberculin reacting cattle, but are prevalent also in steers and cows received for regular slaughter at the various packing houses. Dr. Herman Busman, while Inspector in Charge of Meat Inspection at Omaha, Nebraska, some years ago, inspected the hides of 10,000 cattle on the regular kill and found 134 cattle affected with skin lesions. This represents 1.34% in animals with no other lesions.

Skin lesions are found in those places on animals that come in contact with manure while either standing or lying in it. The lesions appear as nodules and vary greatly in size. Some are barely perceptible upon close examination, while others coalesce and form lesions several inches in diameter. They may be located in the true skin or in the connective tissue just beneath the skin. In many cases there is a fistulous opening in the skin which discharges pus. This is especially true in cases where the true skin is involved. In a few of these cases the fistulous tract has healed and only a scar remains. In all cases where the true skin is involved

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there is thickening of the skin in proportion to the extent and duration of the infection. In many cases of comparatively long standing, caseation or calcification has taken place.

Those lesions which are located in the connective tissue immediately under the skin also vary in size, and are usually spherical in outline and contain a very thick, yellowish or reddish-gray-colored, tenacious pus which often contains calcareous granules. These lesions, when sufficiently large, may be felt through the skin when palpated, as a movable, spherical mass. They may be single or multiple in number. When multiple, they are usually found forming a chain along the principal lymph channels on the legs or on the sides of the body. Frequently lesions are found in the connective tissue of the teats.

In a very large percentage of skin lesions examined microscopically by us, at least 60% have shown acid-fast bacilli. These bacilli resemble the bovine type of tubercle bacilli found elsewhere in the body, with the exception that some shorter forms are found which stain more evenly, although beaded forms are occasionally seen. Attempts to cultivate these organisms have been uniformly unsuccessful, with the exception of two instances: Traum in 1923 was successful in growing a culture of organisms from lesions of the skin of cattle corresponding to the above. Danes, of the University of Utah, was also successful in obtaining a growth of acid-fast bacilli from skin lesions in cattle in 1922. Neither of these cultures proved pathogenic for laboratory animals. Marsh examined 60 teat lesions in reacting cattle in which he demonstrated acid-fast bacilli in 45 or 75% of the number examined. Six of these cases were cultured, but no growth was obtained.

In the branch pathological laboratory in Chicago, where about 200 cases of skin lesions in cattle have been examined, of which cultures on Petrof's media were attempted in approximately 50% of the cases, none have ever been obtained. An equal number of guinea pig inoculations have also been made. In the beginning of this work we invariably sacrificed the inoculated animals at the expiration of 12 to 14 weeks. On autopsy of these animals no lesions of tuberculosis were noted. In all cases, where cultures and guinea pig inoculations were made, acid-fast bacilli had been found in smears made from the lesions.

The absence of lesions in our inoculated animals at the end of three months led us to believe that the bacilli in these skin lesions might possibly have been reduced in virulence while growing in the skin. Therefore we decided to let future inoculated animals live a longer time before sacrificing. Guinea pigs subsequently inoculated were found to be apparently normal upon physical inspection and palpation three months after inoculation, and were allowed to live for possible future development. Five months after inoculation it was found that some of the inoculated animals had enlarged lymph nodes. On autopsy typical lesions of tuberculosis were found not only in the enlarged lymph nodes, but in the liver and spleen as well, in which acid-fast bacilli were found. In some of the other inoculated animals enlarged lymph nodes were not detected until six or seven months after inoculation. Autopsy findings in these also revealed tuberculous lesions.

Cut and stained sections of many of these skin lesions received at this laboratory were prepared, and in each case, with no exception, histopathological changes of tuberculosis were found.

Since skin lesions in reacting cattle were first reported there has been a doubt in the minds of some whether these lesions were actually caused by the *Mycobacterium tuberculosis* or by some other acid-fast organism. In order to shed some light on this question, animals other than guinea pigs were used in the following experiments:

September 25, 1925, four five-month-old calves and four pigs of about the same

age were inoculated with a suspension made from skin lesions of four cattle which had reacted to tuberculin, and in which on post-mortem examination no other lesions were found. In each skin lesion used for inoculation a large number of acid-fast bacilli were demonstrated microscopically. The lesions were typical of those previously described. Each calf received about 5 c.c. and each pig 2 c.c. of suspension prepared by finely grinding material from the skin lesions in normal saline solution and filtering through a single layer of cheesecloth. The inoculations in the calves were made into the subcutaneous tissue over the shoulder. The inoculations in the pigs were made directly into the superficial inguinal lymph node. The inoculated animals were slaughtered six months after inoculation. No lesions simulating tuberculosis were found on autopsy in any of them. Each of the calves and pigs were tested with tuberculin before inoculation, and about three months afterward and again just before slaughter, and were negative to each test.

The test was repeated, using only calves.

February 24, 1926, six calves about six months old were secured and tested with tuberculin. Each calf was negative to the test. At the time the calves were secured they were tagged by placing a metal tag in the ear for identification, the tag numbers being 638415, 416, 417, 418, 419 and 420. March 20, 1926, Nos. 416 and 417 were inoculated. April 17, No. 420 was inoculated. April 23, No. 418; April 24, No. 419, and April 26, No. 415 was inoculated. In each case about 10 c.c. of a suspension of necrotic material from a skin lesion in normal salt solution were injected into the subcutaneous tissue over the shoulders. The skin lesions furnishing the material were from cows that had previously reacted to the test, with one exception, and on autopsy no other lesions were found. The exception was in No. 417. The cow which furnished the skin lesion in this case had previously been tested and was again tested just before slaughter, and failed to react to any of the tests. She had a rather broad thickening on the outside of one hock, which was believed to be a skin lesion. Since she was not pregnant, and originally came from an infected herd, the owner readily consented to send her to slaughter. Upon autopsy the thickened areas proved to be a skin lesion. There was also an abscess on the side of the animal, and the iliac lymph node on the same side contained pus.

In all of the above skin lesions which were used for inoculation, including the last mentioned, acid-fast bacilli were found and guinea pig inoculations were made.

May 25, 1926, all experimental calves were tested with tuberculin. No. 417 gave a positive reaction; all of the others were negative. July 13, all experimental calves were again tested with tuberculin. No. 417 again gave a positive reaction, while all the others were negative. October 11, another test was made, and at this time all the animals were negative. A

final test was made November 13, and again all were negative.

All of the calves were slaughtered November 18. At autopsy all were found free from tuberculosis with the exception of No. 417, which had reacted May 25 and July 13. In this calf the anterior mediastinal lymph node contained a well-marked tuberculous lesion, which was the only lesion found on the carcass. The site of inoculation under the skin in each calf was carefully examined, but no abnormal changes were noted. The lesion in the anterior mediastinal lymph node above referred to was found to contain a large number of acid-fast bacilli. From two or three to 25 or 30 acid-fast bacilli could be counted in each microscopic field. On the following day seven guinea pigs and one rabbit were inoculated with material from this lesion in the mediastinal lymph node. All of the guinea pigs and the rabbit died between January 8 and 27, or from 50 to 70 days after inoculation. At autopsy the rabbit and each guinea pig showed typical lesions of tuberculosis, and acid-fast bacilli were found in smears prepared from the lesions in each animal. There is no doubt in my mind concerning this case. I believe that the skin lesion from which the material was collected to inject into the calf was caused by tubercle bacilli of the bovine type, and that the lesion of tuberculosis found in the calf on autopsy was the result of the inoculation.

In my opinion all of the skin lesions found in cattle that give a positive reaction to the tuberculin test, and in which acid-fast bacilli are found, are tuberculous lesions caused by the Mycobacterium tuberculosis which has gained entrance to the skin through abrasions, because we know of no other acid-fast organism capable of producing such skin lesions, and at the same time give a positive reaction to tuberculin.

However much work is yet to be done along this line and time may prove that these experiments are not absolutely final, because the blazing of the way has barely started.

PREPARATION OF BONES OF ANIMALS FOR MUSEUMS

The skeleton is made reasonably free from the soft parts by dissection. The skull may be sawed across horizontally and the top removed to facilitate removal of the brain. If it is desired to preserve the skull intact, it may be disarticulated and the brain removed through the great foramen at the base with little additional work. The large bones are disarticulated and the small bones of each carpus and tarsus are placed in small separate sacks to keep them together.

The bones are now boiled in a solution containing for each liter of water 30 Gm. of potassium carbonate and 15 Gm. of sodium sulphide. The boiling will require a few hours, longer if the bones are large than if they are small. They should be watched, as prolonged boiling will result in their disintegration. The process will be expedited if they are brushed with a brass brush from time to time.

When the bones are free from all soft parts they should be rinsed, allowed to lie a few minutes in "ammoniated water" and then allowed to soak in warm, soft water several hours to remove the sodium sulphide. They should then be dried and bleached in the sun. If much grease remains in the bones, it can be removed by soaking them in calcium tetrachloride and rinsing in ammoniated water. This can be expedited by warming the water. If the bones are not sufficiently white, they can be bleached to an ivory whiteness by placing them in equal parts of water and solution of hydrogen peroxide. This may require a few hours or a few days. At the end of the process exposure to the sun will make the surface uniformly white. Better results are obtained throughout if during the heating processes the temperature is kept just below the boiling point.

The process outlined is recommended by Mr. John Rowley of the American Museum of Natural History and will be found to give excellent results.—*Jour. A. M. A.*, v. 92, No. 22.

The Stomach Tube in Practice

By W. B. CHAPMAN, Powersville, Missouri

IN the writer's opinion one of the most important articles of equipment, to the practitioner of bovine and equine medicine, is the stomach tube. When administering medicaments to either horses or cattle more satisfaction may be derived by using the tube than by any other method. Then too, there are many other advantages in using the tube in general practice, as will be enumerated later.

It requires some skill and practice to become adept in passing the tube, especially in unruly subjects, but a little patience and perseverance on the part of the practitioner will soon make him proficient and the results obtained from its use are most gratifying.

One of the first essentials in passing the stomach tube is to learn to do so without provoking any more opposition from the patient than is possible to prevent. There seems to be a difference of opinion as to the proper route in passing the tube. Some operators prefer the nasal route, others prefer the oral. My argument in favor of the oral route is that any object that reaches the stomach under normal conditions does so by way of the mouth and we should, so far as possible, stick to the natural route. It has been my experience that more opposition is met with in the horse when attempting to pass the tube through the nose, and in unruly subjects, hemorrhage invariably results. While the latter is not often serious, it is nevertheless annoying to the practitioner and leaves an unfavorable impression with the client.

One article that I carry on all my calls and which I consider indispensable in passing the tube through the mouth consists of a metal pipe one inch in diameter and about ten inches in length through which the tube is passed. This pipe is inserted lengthwise in the mouth and reaches to the base of the tongue and posterior to the last molars, thereby protecting the tube from the teeth. The pipe is held in place by a special bit to which straps are attached which buckle in place over the head as a bridle. Another strap buckles around the mouth which serves to hold the mouth closed. Very seldom opposition is offered by the animal to this instrument and the tube can usually be passed without any further restraint being necessary.

In cases where voluminous doses are given, the stomach tube will be found the method *par excellence* for administration. There is no waste, the dosing is accomplished very quickly and there is no danger of the medicaments reaching the lungs with the usual fatal consequences.

In Bloat in Cattle

Most cases of bloat in cattle can be promptly relieved by use of the stomach tube. In my practice after relieving the tympany an ounce of formalin in a gallon of water is administered before removing the tube. A dose of this size is much easier given through the tube than otherwise and no danger of lung involvment results as mentioned above. However, there are cases in which the stomach tube does not relieve the bloat at once. This is especially true in atony of the rumen. Large masses of ingesta may prevent some of the gas from the posterior part of the rumen from escaping through the tube, and the failure of the muscles of the rumen to contract and break down the mass within, results in the gas being retained even after the tube has been passed. This condition can be remedied by leaving the tube in the esophagus for ten or fifteen minutes and kneading the abdomen constantly during this period with the closed fists. Occasionally a probang should be passed through the tube to remove any ingesta that might be blocking the escape of gas.

Gastric Tympany in the Horse

Often times the stomach tube is a valuable instrument as a diagnostic agent. Especially

is this true in the horse. Many hidden cases of gastric tympany are revealed by passing the tube. Several times I have passed the tube in gastric disorders and large volumes of gas and ingesta gushed from the tube as soon as it reached the stomach. In such cases lavage is indicated. This may be accomplished by either pumping, or allowing to gravitate, through the tube several gallons of warm water. By suddenly lowering the end of the tube a siphoning of the stomach contents occurs.

This procedure should be repeated until the water returns clear, after which a half gallon of warm water containing a medicinal dose or aromatic spirits of ammonia and nux vomica should be injected through the tube and allowed to remain in the stomach. In many cases of gastric tympany and engorgement, this treatment is the only means that will save the patient's life.

For the Relief of Choke

Many cases of choke can be successfully relieved by the stomach tube. I have one particular case in mind wherein the stomach tube was the only instrument that could possibly have relieved the condition. This case happened in a six-year-old mare. The animal was choked on oats and the obstruction extended from the cardiac portion of the esophagus almost to the pharynx. One quarter grain doses of atropin sulphate were given hypodermically every half hour until three doses had been given. A saturated solution of sodium bicarbonate was prepared and the stomach tube passed down to the obstruction. A small amount of this solution was pumped through the tube and allowed to siphon off, each time bringing small amounts of the oats with it. This procedure was repeated until the esophagus was free of the obstruction. During the operation the animal's head was secured so that it remained lower than the thorax in order to prevent the material that returned around the tube from entering the trachea. I like the bicarbonate of soda solution in these cases as it forms a good lubricant for the esophageal wall and the gas formed within the esophagus tends to dilate it.

In cases of simple choke, the obstruction can often be readily pushed down the esophagus to the stomach in a very few minutes by use of the stomach tube. However, it is the opinion of the writer that all cases of choke requiring mechanical interference for its relief, should be preceded by hypodermic medication with atropin sulphate as the latter tends to relieve muscular spasm of the esophageal wall and facilitated operations with the tube.

I have endeavored in the above to present a few of the practical uses of the stomach tube as carried out in my practice.

NUMBER OF BONES DIFFERS WITH AGE

The number of separate bones in a man 40 years old is 206; the vertebral column has 26, the skull 23, the ribs and breast bone 25, the upper extremities 64, the lower extremities 62, the ears 6. In a boy of 14 years there are 350 separate bony masses; in a baby boy at birth there are 270; the individual bones of the adult are formed by the fusion of parts that were at first distinct from one another. New bones continue to appear until one is 22 years old and they fuse with one another at different ages. Girls are at first weeks and afterward years ahead of boys in this respect.—*Hygeia.*

KENNEL INSPECTION

The Chicago Bow Wow Club has undertaken a new and excellent thing, namely, the inspection by a veterinarian of the kennels of the members every four months. The report is made direct to the inspection committee of the club and any conditions that should be changed, are brought to the attention of the offending member.

We believe that after a time there will be periodic inspection of all kennels; this need not be feared for the public is educated to buy from sanitary, inspected places. There can be no better salesman in a kennel than a large certificate on the wall stating that the dogs and kennels are carefully inspected by a veterinarian every three months.—*Dog World.*

Blood Typing Studies Upon the Horse and Ox*

By R. S. AMADON, Philadelphia, Pennsylvania

Blood transfusion is recognized in human medicine as a therapeutic procedure of unquestioned value in the treatment of numerous acute and chronic disturbances affecting the blood vascular system and body tissues in general. Transfusion was practiced to a limited extent by physicians of the fifteenth century and historical records state that knowledge of transfusion antedates this period a good many years.

Blood transfusion as performed by the early pioneers in medicine was not infrequently followed by serious consequences and even death of the recipient of the transfusion. As medical science became more advanced the particular reasons for these adverse results were made apparent and measures were instituted which have eliminated practically all of the attending dangers. The fact has been established that the plasma or the serum and the blood corpuscles contain certain substances which when properly combined result in an aggregation of the red blood cells—the clumping together constituting the reaction known as agglutination, or, more specifically, as isoagglutination when the reaction occurs in blood of the same species. When agglutination occurs within the channels of the circulation the clumps of cells lodge in the arterioles and capillaries and thus obstruct the flow of blood to the body tissues with a consequent cessation of function and consequent death of the tissues involved.

The substances present in the plasma that contribute to the isoagglutination reaction are termed agglutinins. Two agglutinins, alpha (a) and beta (b), are stated to be present in human blood. Within the red blood cells or erythrocytes, substances designated as agglutinogens may be present. Two agglutinogens are also considered to exist in human blood and are referred to as agglutinogens (A) and (B). When a plasma containing (a) agglutinin is brought into contact with erythrocytes containing agglutinogen (A) active agglutination of the erythrocytes occurs. On the basis of agglutinin and agglutinogen content of human blood, Jansky in 1907 and Moss in 1910 classified human blood into four groups.

Jansky Classification

	Cells	Plasma	
Group I	—	a and b	Universal donor group
Group II	A	b	
Group III	B	a	
Group IV	A and B	—	Universal recipient group

The classification of Moss reverses the positions of I and IV, but otherwise corresponds to that of Jansky.

It will be noted that the cells of Group I have no agglutinogens and cannot be agglutinated, therefore, by any of the other three types of plasma. The term "universal donor" is used in connection with this group, as such blood can be used upon patients regardless of their particular type. In Group IV the plasma is free of all agglutinins and consequently lacks the power to produce agglutination of any type of human erythrocytes. An individual of this group may be transfused with blood secured from donors belonging to any of the other three groups. The universal donor may be utilized as a source of blood under emergency conditions, but blood having the same group characteristics as that of the recipient is always to be preferred. By means of a simple test the blood of an individual can be identified as regards its particular type and by this means a list of prospective donors may be compiled and referred to when a certain type blood is required for transfusion purposes. The type charac-

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teristics of the blood apparently remain constant throughout the life expectancy of the individual although varying in intensity under certain conditions.

Blood transfusion has attracted but little attention in veterinary medicine. The possibilities of such procedure in the treatment of disease affecting our lower animals have never been investigated. Undoubtedly, the technique of transfusion has discouraged the practitioner and led to the conclusion that the operative procedure is impractical under the average conditions of practice. Transfusion methods have undergone a marked transition in human medicine and certain simple methods are being successfully used—methods which require but little equipment and are simple in detail. This technique can be easily mastered by the average practitioner of veterinary medicine.

The question arises concerning the possible existence of type characters in the bloods of the various domestic species. This question has frequently been submitted to the writer and, as little or no available data could be found upon the subject, it was decided that some typing studies should be carried out. During the course of the past year 126 samples of horse blood and 110 samples of ox blood were secured for analysis. Dr. C. O. Newhaus, of the State Bureau of Animal Industry, very kindly supplied the major portion of these samples and made possible this survey.

The blood samples were secured in test tubes containing a sufficient quantity of potassium oxalate to prevent coagulation. These samples were centrifuged, the plasma and cells being separated and stored in small test tubes. The cells were suspended in thirty parts of physiological salt solution. Most of the tests were carried out with ten bloodsamples at a time which required the reading of 100 different combinations of plasma and cells. The plasma and cells were combined upon glass slides, one drop of plasma being well mixed with one drop of the cell suspension. The mixtures could be easily read with the naked eye, an agglutination being readily distinguished by the formation of small masses of erythrocytes, these masses being surrounded by clear plasma.

Of the 110 samples of ox blood, no agglutination was observed. There was no indication that this species of blood possessed any type characteristics.

The horse blood, however, has given marked evidence of group characters and a number of types apparently exist. No particular effort has been made to determine the number of groups, as such a classification is of questionable importance in veterinary practice.

These results indicate that blood transfusion in cattle is apparently devoid of any danger from agglutination. Horse blood should be typed previous to being used, to ascertain any possible incompatibility with that of the recipient.

It is of interest to note that oxplasma is universally and strongly agglutinative for horse cells, while horse plasma fails to clump ox cells as a rule, and when agglutination does occur it is a very weak reaction.

This hurried survey of the results thus far obtained in this study will be enlarged later by further typing, and the expeimental application of the data obtained to as many transfusions as circumstances will permit.

MILK BORNE TYPHOID

State health authorities in Iowa report that four out of five typhoid fever epidemics which occurred in 1929 were traced to contaminated milk. An outbreak at Clinton, which was designated as milk borne, involved more than 85 cases. It began early in November with eight cases reported during the week ended with November 8. The next week 28 cases were reported and 39 during the week ended November 21st. A report of five cases during the last week in November and five during the first week in December marked the termination of the epidemic.

Pea Straw Impaction in Horses

By E. T. BAKER, Moscow, Idaho

IDAHO is becoming a great pea-growing state, having had around 72,000 acres planted and producing over a million bushels of seed peas. Consequently, there is a lot of straw, and all animals seem to like it. It has a tendency to cause impaction in horses and diarrhea in cows, although young cattle seem to thrive on it. Another peculiar thing is that one rancher can feed it all winter with no bad results, while his neighbor has nothing but trouble. Possibly a mold or other fungus is at the bottom of the trouble, for we have seen horses with all the symptoms of cerebrospinal meningitis, paralysis, convulsions, and the benign type of simple impaction.

A few days before Christmas we were called out to see seven sick horses in one bunch of sixteen. These animals had been running out all fall, and had wheat straw, pea straw, ice water and scenery for a steady diet. Several days before it had rained, and then several inches of snow had fallen.

Of the seven sick, four were badly bloated, chilled, and in a bad condition. Three were scouring freely, and half a dozen more were in the same condition, except they did not seem sick.

The duration of the illness is from several days to over a week. If the owner has given large doses of salts or coal oil, we expect a quiet rural funeral within twenty-four hours. This is due to the intense gastro-enteritis caused by the pea straw, which differs in this respect from other straws.

The main trouble will usually be found in the colon, not far from the rectum. We can feel a large mass through the intestines, and if we can keep the bowel from becoming paralyzed we may be able to remove the "clog" manually in about twenty-four hours.

Experience with over a thousand cases has taught us to give a very guarded prognosis. When we see a patient covered with a cold sweat, and a hopeless, glassy look in its suffering eyes, as though it had played the stock market, we have a hunch that the hired man will be digging a large hole in the softest place to be found in a back field.

The mortality depends on how soon the client has called in a veterinarian. If we can treat an animal that has not been sick over half a day, the chance for recovery is good—possibly eighty per cent. If it has been sick over a day, the chances are less than half. If it has rolled and tumbled around for a couple days, with plenty of home treatment and neighborhood advice, an undertaker is the proper person to call.

We have learned that too much treatment is just as futile as not enough. You remember the story of the American tourist who became lost in the Swiss Alps. After a long time a big St. Bernard dog came to his rescue. The rescuer had a small flask of brandy around its neck. The American reached for this, and then whistled himself to death trying to call all the dogs in that parish. Well, that is the way with a lot of ranchers. They believe if a small amount of medicine is indicated, a lot more will do just that much more good. We lost a number of cases that had been filled up with intestinal irritants before we were called in. Every practitioner has this to contend with, but can do some educational work. We tell our clients if a horse remains sick over two hours to call in a veterinarian. When we answer veterinary queries for farm papers we always emphasize this, instead of suggesting a lot of home treatment, and then calling in a veterinarian as a last resort.

Now then for the treatment. As we have hinted, there is no specific line of

medication. In treating these seven head, we used two different types of medication.

Beginning with the worse case, we found its pulse very rapid and weak; its temperature about 97° F., and, due to the bloat, very fast, shallow respirations. We gave it hypodermically, a tenth-grain of lobelin, an antispasmodic and half a grain of pilocarpin, with 10cc. sterile ethereal camphorated oil. Orally, we gave it three capsules. The first one, a modified Reeks, the second an ounce of colic mixture, composed of ether, chloroform, oil of eucalyptus, camphor and oil of turpentine. The third one had a small wedge of tobacco with gum acacia. You will notice that arecolin or eserin or barium chlorid was kindly omitted. Our first effort is to reduce the bloat, stimulate the entire animal, and this in turn mitigates the abdominal pain. We then make a manual examination of the rectum, and give a good warm injection. A mild liniment is rubbed over the loins to relieve the owner perhaps more than the patient.

The next case was not so badly bloated and was passing gas. Here we added half a grain of eserin, and gave a laxative composed of nux vomica, cascara and aloes.

The third one was throwing itself around with the pain, so we gave it a capsule of an anodyne, containing cannabis indica, oil of cloves and oil of peppermint.

The fourth one acted paralyzed in the throat, so we merely gave it a hypodermic injection and gave it carefully, on the tongue, an ounce of colic mixture with syrup.

Horses with pea straw impaction assume many attitudes.

The fifth one was in a highly nervous condition, so we gave it a couple antispasmodic hypodermic injections, and the anodyne.

The sixth one showed a bad impaction, so we gave eserin, pilocarpin and lobelin.

The seventh one acted like a typical colic, so we gave it a Reeks, colic and anodyne.

We left a two-ounce syringe with the owner, and a gallon of oil, in which had been mixed a pint each of colic mixture and lime water, with several ounces of mucoseptone. This was well sweetened. Directions were to give each animal four syringes full on the tongue three times a day.

We returned the next day, and found the four worst ones greatly improved, but the one with the bad impaction was weaker.

To make a long story short, all recovered but one. An autopsy revealed a "clog" several feet long, with the mucosae of the colon almost in shreds.

In some bad cases, we have seen recoveries occur when only carron oil was used, together with mild stimulants, such as ginger, salicylic acid and camphor.

Plenty of exercise, water with the chill off, a warm dry box stall or sheltered corral, and good nursing, of course, all help.

In many cases, however, the owner has a lantern that does nothing but smoke; he has no hot water; no shelter for the sick; does not trouble to give the medicine that is left; and drives into town to the local pool room. This client, I am sorry to say for the poor horses, has "no luck."

JEWELRY MADE FROM MILK

At a dinner in New York, a manufacturer exhibited hundreds of beautiful and useful articles made from the protein of milk. From plastic casein (better known as cottage cheese) strands of jade-green beads, bracelets and decorative buckles were made. There was exhibited knife and fork handles resembling old ivory, green lamp shades, amber colored fountain pens and pencils, combs, shoe horns, umbrella tips and ornamental door knobs that had been made from skimmed milk. Casein, the National Dairy Council says, is used also as the base of letters in electric signs. The plastic casein used was made from sweet skimmed milk.—*Jour. A. M. A.*, v. 93, No. 26.

DE VINE'S TREATMENT FOR AZOTURIA

Please outline treatment for azoturia. —N. D.

Reply: As is the case with most ailments that we do not understand, should you ask a dozen practitioners this question, you would probably get as many different kinds of advice. But one thing that I have always contended is that an important part in any treatment for azoturia is to get the animal quiet and keep it quiet.

All practitioners realize that if every horse could be stopped right there, kept comfortable and quiet, just as soon as the first symptoms of azoturia appear, there would be fewer or no fatalities. This being so, it is easily understood why the horse that is in pain and fighting aggravates the condition.

For quieting these cases, I know of nothing that is comparable to lobelin sulphate, giving a dose large enough in the beginning (depending upon the size of the horse and the severity of the pain) and then repeating it often enough to keep him quiet.

If you wish my personal opinion—in which, of course, I will probably again be contradicted by others—I would state that chloral is not the drug to use in these cases. If you do not have lobelin, perhaps cannabis comes next. So much for that.

It has been the practice more or less, "since Hector was a pup," to give an alloetic physic ball. I am positively opposed to this. If large enough and if it dissolves fairly soon after being given, it will add to the distress of the horse and as you know it does not operate sufficiently soon to help in the treatment, that is to help the eliminatory organs during the first few hours when they most need help.

As a rule, if a case of azoturia does not improve, that is get quiet and remain quiet within the first twenty-four hours, or as a matter of fact within the first few hours, chances for recovery are lessened.

So our custom is to first give lobelin; then wash out the stomach, just as you would do in a case of acute indigestion. This, of course, if the case is standing. If the horse is down and struggling it would take quite an acrobat to pass a stomach tube. Consequently, this adds another hazard to the case that is down.

After we have washed out the stomach, we use a half pound of bicarbonate of soda in a part of a pail of warm water and give this through the stomach tube. Leave the tube in the nose for a time and a little later—say a half hour or so—we put a dose of Colic Powder and some of our Liquor Catharticus into another pail of warm water and pump that into the stomach. These preparations stimulate bowel activity immediately—that is within a few hours—but the sodium chlorid in our Colic Powder keeps down gas formation and helps to induce a horse to drink early, and lots of water is a good thing for these cases.

Assuming that we now have the horse quiet and have gone this far with medication, our next concern is to keep him quiet, and stimulate kidney action. For the latter we use our ordinary diuretics, either our liquid one, which is principally buchu and sweet spirits of nitre or our powder which is composed principally of potassium nitrate and potassium bitartrate, alternated every couple of hours with about four ounces of bicarbonate of soda.

Perhaps the one thing that the younger man needs to be cautioned about is not to maul these cases. Slinging them, during the early period of the ailment, is a pretty good way to help them die quickly. Don't be too anxious to have them get up after they are down. If they are well bedded and turned frequently they usually get up themselves with little or no help soon enough. Of course, if they remain down several days it is an indication that there will be more or less of crural paralysis. Then they may need help possibly or slings. If paralysis persists aside from nux vomica or other nerve tonics they require work, or exercise in the field.

Of course, we all realize that it is the heavy horse and the fat one that stands in for a day or two that give us real trouble. That is they furnish the severe cases. The longer the horses stand in, the less liable they are to azoturia and if they do develop it the case is more likely to be milder than it would have been had it developed after a rest of a day or two. However, a few years ago, I had a fatal case in a brood mare that had been turned in the paddock every day.

It is entirely probable that this question and answer may bring some valuable suggestions from others. We welcome them.—J. F. DeV.

A TONIC AND INTESTINAL ANTISEPTIC FOR POULTRY

In the January issue of VETERINARY MEDICINE, page 22, there is an inquiry from S. P. H., Iowa, as to the use of potassium dichromate for chickens and also a reply, which is at variance with my experience in using this drug.

I use potassium dichromate as follows:

Potassium dichromate	ʒ V
Quinin sulphate	ʒ I
Iron chlorid solution	ʒ XVI
Boiling water, q.s.	Cong. I

This is the best tonic and internal antiseptic for poultry of all ages that I have ever found. As a general flock treatment where there is sure to be a variety of ailments, I do not know of anything even approaching it and as for safety, it is fool proof if one ounce of this preparation is added to each gallon of drinking water and kept before them from the time the chicks are hatched until they are ten weeks old, and no other water allowed. It saves a greater percentage of the baby chicks than any other treatment I have ever found.

I have quite a little poultry to treat, several clients raising from 1,000 to 2,000 chicks each year, and when they have tried everything that the peddlers offer

and everything that their grandmother used, and have lost a big part of their hatch, they finally come to me and get some of the "Poultry Antiseptic" like their neighbor got from me, which is the combination of potassium dichromate, quinin and iron chlorid and when I next meet them they usually want some more of "that chicken medicine" and tell me that after the first day's treatment, they had very little loss.

In roup of grown fowls, I double the dose and find it equally as satisfactory.

I prepare the medicine by putting one pint of solution of iron chlorid into a gallon bottle, also the ounce of quinin sulphate. I put five ounces of potassium dichromate into a teacup and pour onto it boiling water. Pour off the water into the gallon bottle and pour on some more boiling water and continue until the dichromate is all dissolved; then fill the gallon bottle with warm water and shake gently; let settle for an hour, and dispense as needed. By doing this, you will soon have a reputation as a chicken doctor.

This medicine does one thing that is detrimental to the flock, however, which is: It keeps the chickens alive and they grow up apparently healthy, when in reality some of them are infected with B. W. D., and should have died as they remain carriers and disseminators of that infection.

I have used bichlorid of mercury, catechue potassium permanganate, solicylic acid and tanic acid, copper sulphate, carbolic acid, hydrochloric acid, capsicum and many other drugs, but this combination of drugs has surpassed them all in effectiveness.

I do not wish to go on record as disputing B. F. K., but feel that he has never come in contact with the same conditions of poultry that have failed to respond to these other treatments, and then responded to potassium dichromate, quinin and iron chlorid. I have a demand for this preparation the year around.—C. B. H., Illinois.

MARYLAND HOG-CHOLERA STATISTICS

On the premises where hog cholera was reported to exist during the month there were 334 hogs when the disease appeared. Sixty-nine were dead and 92 were visibly sick before the outbreaks were reported.

Three hundred thirty-four outbreaks of hog cholera were reported in Maryland during 1929 against 938 for the year 1928 and a ten year average of 588 for the same period.

In 40% of the outbreaks reported during 1929 only five hogs or less were involved while 27% of all hogs in the outbreaks reported during the year were in garbage feeding plants.

The year is lost that does not furnish at least one alleged cure for hog cholera. 1929 was prolific in that regard but here is the latest one. Give the hogs a little aconite and a little nitre. The exact dosage is of little moment so long as only a little is given. The final outcome is the same as with all other so-called cures, but the animals are believed to die a little easier than they do without the cure.

College Park, Md. I. K. Atherton.

NOVEMBER, 1929, SET NEW RECORD IN CATTLE TUBERCULIN TESTING

Steady progress has been made in the tuberculin testing of the cattle of the United States, and in November, 1929, more cattle were given this test than in any month since the beginning of the eradication campaign, says Dr. A. E. Wight, in charge of tuberculosis eradication, U. S. Department of Agriculture. The total number of tests made by State and Federal veterinarians in November was 1,207,573. Of this number 17,567, or about 1.4 per cent, indicated the presence of tuberculosis in the animals.

Previous to last November there were nine different months in which the number of tests made per month exceeded 1,000,000, but in no case did the number reach the 1,200,000 mark.

TETANUS IN A POLICE PUPPY

The occurrence of rabies and tetanus among small animals in the Pacific Northwest, west of the Cascade Mountains, is very rare, consequently the following

Tetanus in a puppy. At this stage the patient was almost as rigid as it would have been if solidly frozen.

case report is interesting to us and may be to others.

A police dog 4½ months old was recently brought to the hospital with the history of inappetance and dyspnea. On examination, the animal seemed playful, the temperature was 101, breathing was a trifle fast and the pulse accelerated. The ears were slightly drawn and the fore legs not as flexible as they should be. A few temporary teeth were pulled. The dog had not been in any fight, there had been no history of any wound or could any be found. It had chewed on sticks, rocks and other material because of the erupting permanent teeth.

A definite diagnosis was not made but the client was asked to return the dog in a day or so.

Three days later the dog was seen again, but an entirely different picture presented itself. The eyes were squinty, ears drawn down on the head, jaw set and the forequarters and back very rigid.

1,000 units of tetanus antitoxin was given and in 2 days 500 more were given. On the third day the dog showed slight improvement. It was fed with liquid food for several days. 5,000 units of antitoxin were given during the next five days, the dog showing a gradual improvement. On the tenth day the animal was decidedly better and progress was rapid thereafter.

In discussing the case with fellow veterinarians, we found that a few cases of tetanus in horses, had been treated in this vicinity where the dog came from, which makes us draw the conclusion, that as a result of chewing on some infected material, the organism gained its way into the body through the exposed tissue caused by the erupting teeth.

Wm. E. Ruggles.
Portland Dog & Cat Hospital,
Portland, Oreg.

ANTE-PARTURIENT PARESIS

Every now and then the question of milk fever and its association with parturition is brought up in one way or another. It seems to me that there has been more discussion on this subject lately, probably due to the unusual amount of research that is being carried on, at the present time, in an effort to determine the etiology of this ailment.

The question is frequently asked "How long before calving and how long after may milk fever occur? Of course, no one knows. I have discussed this subject several times in VETERINARY MEDICINE.

In the May, 1929, number of VETERINARY MEDICINE, Doctor Meyers of Coloroda described a case that he regarded as ante-parturient paresis and asks if it ever occurs as long as six weeks before calving.

I have within the past few days, seen a case with a colleague with the following history. A pure-bred Jersey cow milking about twenty pounds per day; running to pasture; due to calf in about two months; found down in the field in the morning; removed to an open shed.

Symptoms of parturient paresis were not pronounced enough for a definite

diagnosis so she was tapped and given stimulants.

During the day she grew gradually worse, if anything, but was not completely prostrated at five o'clock in the afternoon, when I first saw her with my colleague. With a little aid she could sit upon the sternum. Her movements and the location of her head were not typical, however I suspected an atypical case of ante-parturient paresis and thought it might be well to inflate her udder, which we did. Neither of us had any sterile glucose and from experience it is my personal opinion that if hypoglycemia plays any part in this ailment it is with the atypical cases, so we did the next best thing, we gave her eight ounces of corn syrup. The day being warm, the syrup thin we gave it per os with great care. Her throat muscles were not entirely paralyzed. She could make feeble movements, evidently sufficient to take care of this non-irritating liquid. As she was again somewhat bloated the trocar was inserted and left in. She was propped up and made comfortable and the owner was instructed to keep her in this position. He reported later that she seemed bright and quite comfortable—around ten o'clock that evening when she was left for the night.

In the morning when the attendant went to see her, she was not there. She had gotten up during the night and gone to pasture.

She aborted a dead immature fetus two days later, but otherwise made a satisfactory recovery.

Goshen, N. Y. J. F. DeVine.

TYPHOID DUE TO CARRIER

The twelve cases of typhoid which developed in Hammonton recently have been traced to the wife of the dairyman who supplied milk to the victims. The wife, who did most of the milking for the dairy, was found to be a carrier. She had typhoid many years ago. The infected milk had not been pasteurized.—*Jour. A. M. A.*, v. 93, No. 8.

PARROT FEVER

Newspapers of late have made much of certain cases of parrot disease in man. The disease is not as new as newspaper accounts would lead one to believe. Under the name "Psittacosis," Hutyra & Marek has the following to say:

"This is a disease of parrots imported from Africa and America to Europe. Its etiology was established by Nocard in 1897. At that time he as well as Gilbert and Fournier associated it with an epidemic pneumonia of man in Paris (1892-1896), when, out of 49 persons, 19 died of the disease. Lichtenstern, as well as Bacher, Selter and Finkler, have expressed doubt as to the correctness of this assertion regarding it as not having been sufficiently proved. The etiological factor found by Nocard, *Psittacosis bacillus* was shown by comparative tests by Rho to be a paracolon bacillus, whereas Pfeiler's investigations proved the organism to be identical with the paratyphus B. bacillus. Finkler and Selter designated it as parrot plague bacillus."

ATHERTON SPRINGS A "HOT" ONE ON UNSUSPECTING MARYLANDERS

Here is a hot one from the wild and wooly West. In 1928 a farmer had the double treatment administered to a number of baby pigs. In a few months several of them were sold to a neighbor. About the time that the animals which had been sold reached maturity a number of them became ill. An official veterinarian was called, who after a post-mortem examination, pronounced the trouble as hog cholera. As the party who had sold the hogs had informed the buyer that the animals were immune to cholera he was much exercised over the case. The veterinarian who had treated the animals was called in and he insisted the trouble was not cholera. In fact, that it could not be cholera as the animals had been immuned to the disease. He informed the original owner of the hogs who had 27 of the animals left that if he would

permit, he would demonstrate, by inoculating the hogs with hog cholera virus, that they were immune and that he would pay the farmer for all the animals that died of cholera. The farmer agreed to the experiment but is now suing the veterinarian for the value of 26 of the 27 hogs which went to the happy rooting grounds via the hog cholera route.

I. K. Atherton.

College Park, Maryland.

TREMBLES, OR "MILK SICKNESS," NOW A RARE DISEASE

"Trembles" is the name now given to a disease often called "milk sickness" in the days when population was spreading westward in the Ohio Valley. The disease affects animals as well as human beings, and it may be transmitted to people by animals that have eaten white snakeroot, a poisonous weed. In some areas of Arizona and New Mexico the same disease results when cattle eat either of two species of the rayless goldenrod. Investigators of the U. S. Department of Agriculture have made feeding experiments with the plants, and J. F. Couch, a chemist of the Bureau of Animal Industry of the Department specializing in the causes of live stock poisoning, has isolated from the plants the poisonous substance, tremetol, which causes the disease.

In pioneer days the disease was reported frequently, usually by the name "milk sickness." The Department of Agriculture considers "trembles" the better name, as it suggests one of the symptoms. There is no recorded case of the disease in a city. All known cases have originated either on farms or from milk products supplied directly from farms. In the general milk or cream supply for a city or in creamery butter the poisonous substance would be so greatly diluted that it would hardly be possible for it to be harmful, the men who have studied the disease believe.

FRACTURE OF THE HUMERUS IN A DOG

Recently a dog weighing about 30 pounds was brought to me with a fractured humerus. The fracture was about 1½ or 2 inches below the head. He was so injured internally that he died a few days afterward. An autopsy revealed that I did not have very good success in setting and splinting the fracture in that particular place. I could not seem to get the desired rigidity to prevent the weight and movement of the leg from slipping the ends of the bone past each other.

I would like to have some experienced dog practitioner explain fully to me just how he handles a fracture in a place like this. Mine is a general practice, but I am getting more dogs all the time and must brush up a bit in order to handle the situation properly.—C. O. W., Wyoming.

Reply: Our results with these fractures, especially where they were as high as yours was, have not been very good. We find a great many of these are diagonal or oblique fractures and it is impossible to straighten such legs and fix them in position. We of course can hold the bone where it happens to be, but often that is the worst possible position.

Ordinarily if one of these legs is let alone, the weight below the fracture gradually pulls the bone to a more nearly normal position than is found just after the fracture. I believe that many dogs do better if no attempt is made at reduction of such fractures. The angles of dogs legs make it almost impossible to put traction on them in the right direction, and very often, I think it better to let these cases absolutely alone and let nature take its course.

If we put these cases in fixation bandages we often find that we have fixed them in just the worst position possible, and have interfered so that the leg can not automatically be lengthened from its own weight.

With oblique fractures it is impossible to hold the ends of the bones in apposition without some means of extension or bone

plating. Bone plating is a serious procedure and not warranted in these cases because most of them do well without it.

Many practitioners employ a cast in all of these cases; sometimes with a cast that holds, but more often, I think, with a cast that works on the owner's mind more than on the dog's leg. I believe that in most of these cases of humerus fractures they will do better if the cast is left off—H. J. M.

WONDER IF THEY HAVE NONE BUT AMERICAN MEDICAL DICTIONARIES?

To the Editor of The Veterinary Record.

Sir.—Much interest is at present being centered around a type of disorder of the dog commonly known as "Hysteria."

This name may satisfy those of us who are fond of the use of a simple single word. The American, never to be ousted from his inventive sphere, appears to have named this disorder "Hyperkinesia." Now this compound word is a curious name for a disease. According to Gould's "Dictionary of Medical Terms," "Kinesia" is defined as "Motion-cure," so we now have a disease named as a cure!! On the other hand, "Kinetia" is given as "Motion-disease." This, so far, is plain sailing.

But if one looks up Dorland's Dictionary we find under the term "Kinesia" also the word "Kinetia," given as an alternative spelling and they both mean "Motion-disease."

So, after all, the American is correct as judged by himself!

Yours truly, Harvey S. Purchase,
The Veterinary Record, London, England.

NEW YORK PASSES HALF WAY MARK IN TB ERADICATION

Up to December 16, 1929, all cattle had been tuberculin tested one or more times, or testing was under way, in 648 of the 932 townships of the State of New York, or 69%. All of the cattle have been tuberculin tested in 506 of these townships, or 54% of the total.

TB ERADICATION IN ROCK COUNTY, WIS., CELEBRATED BY DAIRY ACHIEVEMENT DAY

Dairy Achievement Day, recently held in Rock County, Wisconsin, to celebrate the successful eradication of bovine tuberculosis from the county, was the first event of its kind in the 12 years of systematic tuberculin-testing work. Exhibits, addresses, and entertainment features formed a diversified program.

According to a report to the United States Department of Agriculture by James S. Healy, the federal inspector in charge of tuberculosis eradication in Wisconsin, the occasion exemplified the manner in which the campaign to suppress tuberculosis goes hand in hand with other constructive agricultural measures. Though Dairy Achievement Day was arranged principally to celebrate Rock County's freedom from bovine tuberculosis, popular interest centered largely in the striking benefits which dairying and cattle breeding in the county have received from the suppression of that disease.

Net Gains Exceed $500,000

A comparison of returns received for dairy products and cattle, before the tuberculin-testing campaign and afterwards, revealed that producers in this highly developed dairy county are now receiving annually over half a million dollars more than in 1925 before the area test. This gain has been achieved in spite of the condemnation and slaughter of more than 8,000 reactors to the tuberculin test. Tuberculous infection in Rock County exceeded 14 per cent of the cattle at the time of the first test, and the reduction of such infection to less than one-half of 1 per cent, at present, is regarded by veterinary officials of the United States Department of Agriculture as an achievement that should encourage other seriously infected counties to undertake similar work.

After the removal of the reactor cattle, restocking proceeded gradually and dairymen observed with satisfaction an increase of about 20 per cent in milk production the

first year, although they were milking fewer cows. Present milk production of the county is about 50 per cent greater than in 1925 before the area test.

Cattle, Swine, and Poultry Raising Benefited

The financial benefits mentioned are the results principally of a more profitable market for milk, but better prices for surplus cattle and larger sales of cattle also have contributed to the total. In addition, a local chick-hatchery operator had the tuberculin test applied to the flocks under his supervision and all chicks have been subsequently hatched from eggs of tuberculin-tested hens. This plant had no surplus of chicks at any time during the recent hatching season.

Swine breeders of the county likewise are benefiting financially by the premium of 10 cents per hundred pounds paid by packers for swine raised, marketed, and tattooed as coming from the county which is now a modified accredited area.

MORE THAN 10,000 SQUARE MILES RELEASED FROM TICK QUARANTINE

Notice of the release of 10,358 square miles of additional territory in four Southern States from Federal quarantine on account of cattle ticks is contained in Bureau of Animal Industry Order No. 321 recently issued by the U. S. Department of Agriculture.

The order releases the following counties from the quarantine: Clarke county in Alabama; Baker, Columbia, Suwannee, and Union counties in Florida; Amite, Clarke, Jasper, Jefferson Davis, Lawrence, and Simpson counties in Mississippi; and Bell, Red River, Upshur, and Wood counties in Texas.

The order also requarantines Jefferson Davis Parish, Louisiana, the area of which is 729 square miles; and it continues the existing quarantine in the State of Arkansas and the Territory of Porto Rico.

With the release of Clarke county, Alabama, all of Alabama becomes free from the tick embargo.

VETERINARY BLOOD GROUPING

Stimulated by surgical and medicolegal necessity, reliable technical methods have been developed for the determination of human blood groupings. Attempts to apply the same technic to lower animals, however, have given negative or inconclusive results. As late as 1927, for example, Kunz was unable to demonstrate blood groupings in domestic cattle. Technical methods applicable to veterinary medicine, however, have recently been developed, the essential feature of the veterinary technic being an immediate centrifugation of the serum-corpuscle mixtures. In strongly positive hemagglutination the centrifugated corpuscles form a solid disk at the bottom of the tube, remaining intact when shaken, and floating round in the clear supernatant fluid. In weaker agglutination the disk breaks up into larger or smaller fragments. In negative reactions the packed corpuscles are readily dispersed throughout the supernatant fluid. Applying this new technic, Dr. R. B. Little of the Rockefeller Institute, Princeton, N. J., has been able to demonstrate three blood groups in domestic cattle, with the suggested possibility of a fourth, or aberrant, group. His observations open the possibility of detailed study of hereditary factors and biochemical mechanism, so difficult in human medicine.—*Jour. A. M. A.* v. 94 n. 2.

UNDULANT FEVER GERMS HEAT RESISTANT

Ordinary pasteurization methods will not kill the porcine strain of the undulant fever bacillus, is the conclusion of Dr. Lloyd Arnold, professor of bacteriology and pathology at the medical college of the University of Illinois and head of the Chicago branch of the diagnostic and re-research laboratories of the State. The bovine strain of this organism is readily destroyed by milk pasteurization.

Poultry Diseases*

By WALTER WISNICKY, Fond du Lac, Wisconsin

WISCONSIN offers a good field for poultry practice. The practice is there to be done and the veterinarian should do it. His training and his position in the community render this an obligation that he should not side step. Probably the reason veterinarians have not taken more kindly to poultry practice in the past is because of the belief that it doesn't pay. This is not necessarily true. It can be made to pay the veterinarian and the flock owner. Poultry practice differs from practice with large animals in that almost never is the veterinarian called upon to treat the individual bird. It is a flock practice, or perhaps one should say, farm practice, because usually the problem is one of sanitation, either alone or in conjunction with treatment of the flock.

Many things, of course, affect sanitation, but the type of yards and houses is perhaps the most important. Yards must be well drained and poultry houses of ample size. Where the housing is inadequate either in the protection furnished the birds or in the space provided for the individual bird, trouble will be great. Yards that are covered with water a part of the time must inevitably lead to trouble.

Feed is important, but a very wide latitude is possible. Faults are more likely to be found in the manner in which the feed is given than with the feed itself. Formerly it was thought that laying hens should be given scratch feed in deep litter to force them to take exercise. This is not in accordance with modern teaching. It has been shown that forced exercise is no more necessary for laying hens than it is for the dairy cow, and certainly to feed hens in a litter which must contain their own droppings is about as bad practice as can be conceived from a sanitary viewpoint. To force hens to eat their own dung violates every principal of sanitation.

The range is important and the same range should not be used for poultry more than one year out of three; that is, after being used a year, all poultry should be kept off of it for two years. It is hard to say just how large a range should be, but it should be of sufficient size to be covered with vegetation. When it is crowded to the extent where there will be bare spots here and there on it, there are too many birds on it. Temporary range shelters on the range are better than colony houses. There is too much tendency to leave the latter in one place until the ground becomes severely contaminated about it. This, however, can be in a measure avoided by moving the feeding hoppers every day. If colony houses are used, set the feeding hoppers close to the colony house in the beginning and move them about ten feet farther from it every day. Where temporary shelters are used they should be moved very frequently.

Bacilliary White Diarrhea

Bacillary white diarrhea, which for the New England states has been officially named pullorum disease, and a very good name it is indeed, is undoubtedly the most important disease of baby chicks. Hens with infected ovaries will produce some infected eggs; that is eggs containing the *Bacillus pullorum* in the yolk. Some of these eggs will hatch and the infected chicks immediately become spreaders. Chicks will start dying almost at once, some of them probably in the incubator and the peak of mortality will likely be reached about the ninth day after hatching. The loss in a batch of chicks containing infected chicks will be large, but

* Notes from an address at the 15th annual meeting of the Wisconsin Veterinary Medical Association, Madison, January 15, 1930.

under good brooding conditions, will be less than under poor conditions.

The diagnosis of pullorum disease is not always easy. The same symptoms are produced by overheating, improper feeding, improper brooding, and perhaps other causes. The lesions likewse, while fairly definite, are not pathognumonic.

Treatment other than good sanitation is futile. The disease is hard to control under general farm conditions.

In adult birds, pullorum disease can be recognized by the agglutination test. Elimination of infected birds by means of this test from flocks producing eggs for hatching is a useful procedure in intensive poultry districts, but this measure is of very restricted use if of any value whatever in the general farm flocks.

Coccidiosis

Coccidiosis is widespread in Wisconsin, but probably not very prevalent in any locality. It is a stubborn disease to handle, usually attacking the largest birds of the flock, those along 12 to 14 weeks of age. The loss may begin rather slowly. The birds at first look pale, blood appears in the feces and they die. The diagnosis can be made easily with a microscope, by finding the coccidia. Once it appears on a farm it is exceedingly hard to prevent loss from it. Prevention lies in strict cleanliness of the brooder, keeping the poultry house dry and feeding only in hoppers. The best treatment is dried buttermilk, but an infected flock never does well. Even though the birds may not die, they are stunted and their growth and development retarded by the disease, and this occurs even in birds that show no clinical symptoms of the infection.

Parasites

The external parasites of birds are mites and lice. All are perhaps familiar with the appearance of the common chicken mites. It occurs in all flocks, but the prevalence of mites is easily kept down to a point where they do no serious injury. As is well known they feed on the birds and immediately leave them to live in cracks in the roost, walls of poultry houses, in accumulated manure and elsewhere. Control consists in painting the premises that harbor the mites with some creosote preparation or with oil. Crank case oil is quite effective and, of course, readily available everywhere. Its disadvantage lies in that it dries slowly and the birds must be kept out of the house for some hours after it is used.

Seven species of lice occur on birds, but the species don't matter. Control measures and treatment are the same for all. Sodium flourid dusted on the birds or in mild weather made up in solution and the birds dipped in it, will destroy the lice. Painting the roosts with nicotine compound is also effective.

Avian Tuberculosis

Tuberculosis is widespread in Wisconsin flocks. As is well known, it affects the older fowl. It is easily recognized. When birds one or two years old or older in a flock are going lame from time to time, becoming thin and dying without other observable causes, it is well to suspect tuberculosis. The lesions in the liver and spleen and along the intestinal tract render diagnosis very easy. Tuberculosis in poultry is very easy to handle. It is only necessary to dispose of all birds on the premises at the end of the first laying season, to hold the disease in complete check and in time, perhaps four or five years, to eliminate it.

The avian tuberculin test applied intradermally in the wattles is a reliable means of diagnosing the disease, and the use of this test in the removal of infected birds by this means is practical in flocks of high breeding value. It is not practical, however, in the ordinary farm flock. The disease in the farm flock should be handled as already stated, by disposing of all birds before they are a year old and replenishing the flock by the purchase of baby chicks or the incubation of eggs from other sources.

Fowl Typhoid

Fowl typhoid is an acute infectious disease chiefly of adult birds. It is caused by an organism closely related to the *B. pullorum*. The disease is ushered in with high temperature, sometimes as high as 114 degrees F. The bird sits humped up in a dumpy stupor. The liver is enlarged. The disease can usually be definitely diagnosed by the history, symptoms and lesions, but a laboratory examination of an infected or a dead bird makes it conclusive.

The spread of the disease in a flock is usually somewhat slow at first and decreases slowly also. When it appears, infected birds should be killed and their carcasses burned without spilling any of the blood. Good sanitation instituted and the flock given biologic treatment.

Fowl Cholera

Fowl cholera is an acute infectious disease that is easily confused with fowl typhoid. It is due to one of the hemorrhagic septicemia group of organisms. It differs from poultry typhoid in that the onset and spread is more sudden. The comb and wattles are usually a bright red, whereas in fowl typhoid they are pale or bluish. On post mortem examination, hemorrhages may be found in the intestine and, of course, hemorrhagic areas elsewhere.

Respiratory Diseases

The ordinary colds that appear in flocks are due to poor ventilation, poor sanitation, bad hygiene, poor housing and are avoided by remedying these conditions. Chickens must not be exposed to drafts and must be protected from extreme cold. The symptoms are well known, sneezing and nasal discharge being the more common.

Infectious bronchitis is recognized by a rattling in the trachea and bronchi and by gasping. The same conditions that favor common colds favor the appearance of infectious bronchitis, but once started in a flock, at times nothing will stop it, and poultry raising must be discontinued for a time. Treatment consists in the use of quinine and antimony, and using an antiseptic in the drinking water. The antiseptic in the drinking water is to prevent its carrying the infection and not for its effect in the intestinal canal. If the infected birds can be confined in colony houses or other buildings where artificial heat can be supplied by brooder stoves or otherwise, it will be very helpful. In fact, good sanitation and artificial heat will accomplish more in the control of the disease than any other measures.

Chicken Pox

Chicken pox occurs widely in the farm flocks of Wisconsin, but only occasionally. The mortality is not high. The serious loss is from reduced production. Follicle vaccination is effective in the control of this disease. Where it occurs in a flock one season, all young birds on the premises should be vaccinated the following season. This vaccination should be done in the early fall, in September or October.

Birds are very prone to become carriers not only of pox, but of all other diseases, and any bird from a flock that has been affected with any infectious disease should be looked upon with suspicion. While it may be entirely healthy, its introduction into a new flock may be disastrous.

VETERINARY RESEARCH BOARD

As a result of a cooperative arrangement undertaken between the Live Stock Sanitary Board of Montana, the Montana Experiment Station, the Stock Growers Association, the Wool Growers Association and the veterinarians, an institute has been organized known as the Montana Veterinary Research Board. The laboratory and headquarters will be located at Bozeman, and will be in charge of Hadleigh Marsh, formerly of the Live Stock Sanitary Board.

The governing body will be known as the Advisory Committee on Veterinary

Research, and will consist of the director of Agricultural Experiment Station, the executive officer of the Live Stock Sanitary Board (state veterinarian), a representative of the Montana Wool Growers Association and a representative of the Montana Stock Growers Association.

The Montana Agricultural Experiment Station will provide land and buildings for the use of the Veterinary Research Board and contribute $6,500 per year; the Montana Live Stock Sanitary Board will supply funds to the extent of $8,000 a year for the next two years. After that time, presumably the state legislature will make appropriations for the upkeep of the Research Institute.

IODIN AND TEMPORARY STERILITY

Two Jersey cows and a Jersey bull were reported to have been running together for nearly twelve months and the cows were not in calf. The owner stated that he had never seen either of the cows in estrum, nor had the bull shown any mating propensities. The class of country involved was heavily timbered hills with poor, sparse pasture. A certain amount of top-dressing with superphosphate had been applied from time to time, and rock salt was available. The extravagant dose of five grains of potassium iodid twice daily per animal was given in solution in the feed. Three weeks later the younger cow came in estrum and was duly served. Six weeks later the older cow came on and similarly excited the bull. Each cow has proved to be in calf from a single mating.—G. Fethers in *The Australian Veterinary Journal.*

DISCRIMINATING DISEASES

Some infectious diseases thrive best where the crowds are thickest. Some, like the rain, descend indiscriminately upon the just and the unjust, the urbanite and his country cousin. Others are at their worst in the great open spaces, so to speak, or at least far from the city's maddening din.—*Illinois Health Messenger.*

EXAMINATION AND TREATMENT OF NON-BREEDING MARES

Please tell me just how to go about the mare to examine her.—Virginia.

Reply: In examining a mare, there are things which may appear at first sight as of little importance but which should be very strictly adhered to, keeping in mind that a mare is much more susceptible to uterine infections and septicemias than is the cow.

We realize this is an important question, particularly in the case of thoroughbreds. We are so apt to find grooms who are over wise. One man will tell you that you don't need to put a hopple or restraint on this mare as she is perfectly quiet. Then again he is sure another will kick your head off, no matter how much you restrain her. In these well meant admonitions, as in most anything else, we have to use our own judgment. Our custom is never to examine a thoroughbred mare without some restraint. The heavier or phlegmatic breeds are different. On the other hand, too much restraint is not usually a good procedure for a nervous, bad tempered mare. But at any rate, a twitch and a side line or hopple should be used. The mare that is usually regarded as safe, is sometimes the one that will let both heels fly, perhaps just at a critical moment when your fingers are determining something essential. We have had made a special hopple, the pattern for which was given to us by Dr. Frank Wehle of Kentucky. It is an ideal hopple for one who is doing a lot of this work with thoroughbreds—a plain, heavy, strap buckling around the hind fetlocks and around the forearms just above knees. It is put on just taut, not tight enough to draw the legs from their normal position. Quiet mares do not resent it. A vicious one when she kicks, immediately takes her front legs from under her and it seldom requires more than a few dumpings on her nose to make her realize that she is not getting any place by such actions. If operating on hard surfaced floors, it is always

well to place knee pads on such an animal. Ordinarily stocks are contra-indicated, however, for years, we have used stocks for routine examinations; but when we find a very vicious mare, as we sometimes do, we place her in a well bedded stall, or take her out on the soil, because if you attempt to restrain such a mare in stocks, there is ever the danger of her seriously injuring herself and she will fight to the finish. You may count on that. But, if she is taken where this simple hopple can be used with safety, she soon changes her mind.

We should go about the examination approaching surgical cleanliness as nearly as practical. The tail and the external genitals should be washed and it is well to bandage the tail with a clean bandage. In other words, avoid in every reasonable way, the probability of soiling or infecting the hands or instruments, particularly when gathering the cultures.

It seems unnecessary to advise a trained man that he should have the speculum and other instruments in a clean receptacle, thoroughly covered with water to which has been added some reliable antiseptic. The hypochlorites seem to be about ideal for this purpose. By carefully placing the speculum in the vagina, the mouth of the cervix can be viewed with the aid of a light, and a heavy platinum loop, after being flamed, can then be passed into the cervix. In this way we are able to secure uterine cultures, without vaginal contamination. Any small alcohol lamp will do for the flaming. A modern cigar lighter filled with alcohol is very convenient. It is well to inoculate two tubes from the same animal. As in the first tube, flame the loop and secure fresh material for the second. We use a heavy platinum loop on about a twenty inch glass rod. The result of this culturing is of material aid to us, after it has been incubated and examined microscopically. In other words, we always feel that we should have prompter conception and a higher percentage of conception in mares that show no infection, but, like other things, this is not mathematically correct.

Statistics of the Kentucky Experiment Station show that in a total of barren mares, taking 1606 as 100 per cent, the number of this lot not infected was 1019 or 63.45 per cent or at least yielding a negative bacteriological finding.

The organisms most constantly found are the *Streptococcus genitalium*, the *Encapsulatus genitalium* and *Abortivo equinus*.

If mares are regularly cultured, say at least at two or three week intervals, and if regularly negative for two or three examinations, there should be no need of further regularly culturing these mares; but if the mares are found to be infected, an occasional culturing is the only method we know of, at present, to determine the progress of the treatment.

As to the treatment, in this as in many other things, each individual veterinarian may have his own preferences for the preparations used. In our own case we always make an autogenous bacterin and give the mares weekly injections while we are treating them. We begin with about 4cc, then in a week give 8cc and then perhaps 10cc, continuing the 10cc dose weekly for an indefinite period. In the case of severely infected mares, it is frequently necessary to carry them over a year and perhaps treat them for months and months. It is absolutely and positively a mistake to breed a mare while the uterus is still infected. She is not only liable to abortion, but is also very liable to infect the foal and have it born dead or a weakling.

For douching we use the same preparation we do for cattle and for bitches, that is, sterilized sodium chloride triturated with permanganate of potash, having the solution real warm and being careful not to do any injury by pumping it with pump and tube or pump and catheter, massaging it around gently but well by hand via the rectum, then pressing it out or syphoning it out. We repeat this as often as we dare to, for the first times,

which is probably every three or four days for two or three treatments, then once weekly after that. After perhaps a few douchings, depending on the case, we would use the special iodized oil, the formula of Dimock. This certainly is a pronounced improvement over any preparation we have ever tried in the way of medicated oil. At the suggestion of Doctor Dimock, we propose to use this oil on every mare after foaling, if she is in a band of brood mares giving trouble.

Occasionally we find a uterus that does not respond to any ordinary treatment. There is not so much of a discharge, perhaps, but it seems to be more like true metritis involving the walls which are hot and thickened and this condition is frequently associated with persistent estrum. So for these cases, for years, we have used camphorated oil, placing a pint or a quart in the uterus, massaging it around and leaving it in until the next treatment, say, three or four days later. We have likewise recommended this to others and reports have been most satisfactory in most cases.

Our records indicate that mares not too old and not too severely infected, respond fairly well to treatment. When the uterus improves and the cervix closes and we get negative cultures, we usually discontinue treatment except the hot vaginal douches and bacterins. These are continued for perhaps another month or so and then if the cultures are again negative, we regard the animal as in condition to breed and she usually does.

Now as to this local or surgical treatment, we must ever keep in mind that *it all depends entirely on the clinical evidence of infection. If the cervix is tight and the uterus feels fairly normal to the touch and there is no positive evidence of pyometra or endometritis then surgical interference that may infect or aggravate a slightly infected cervix, on surgical principles is contra-indicated. In such cases, even if the cultures show a mild infection, it is best to depend on daily hot douches, bacterins and weekly gentle massaging.*—J. F. De V.

RUMENOTOMY IN THE OX*

The accompanying illustrations are of the same patient following rumenotomy, taken at different intervals to show progress of the case.

1. Morning after operation.
2. One week after operation.
3. Two weeks after operation.

During the past two seasons I have performed rumenotomy on eight cases, which are all the same in three respects. First as to the trouble—over loaded rumen or engorgement. Secondly, all were operated on after dark and lastly all were caste and tied. Automobile headlights furnished the illumination.

Three cases were operated on during 1928 with good results. That is—with no sequel of fistula of the rumen, nor extensive adhesions of the rumen to the wall of the abdomen.

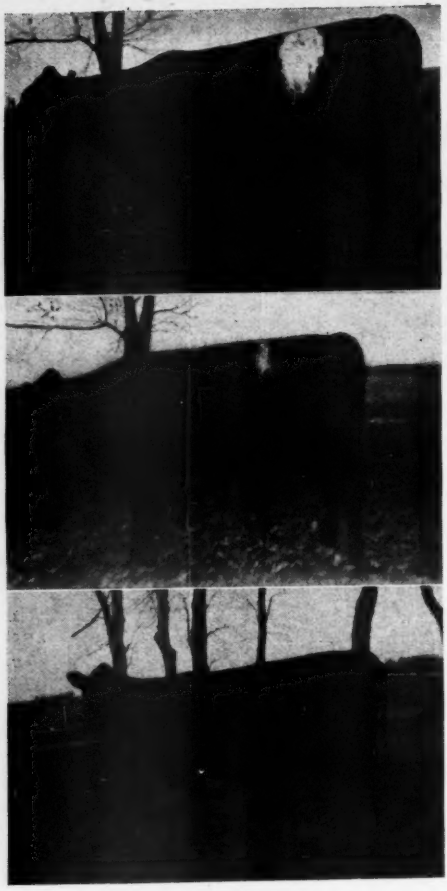
The one was a case of a two-year-old bull and the other two were cases of stock nurse cows with their calves in clover pasture. The cows raised their calves.

In 1929 I operated on five cases with the same results. Others were attempted primarily to satisfy the owner. The July 8th case is reported because of being in the mid-fly season, and the October 25th case since it is the last and the pictures accompanying show the progress of the case.

July 8th Shorthorn cow on clover pasture with two calves nursing. Rained hard the night of the seventh. Hot and sultry all the forenoon. The owner attempted taping in mid-afternoon when case was found, but this was ineffectual in deflating the greatly distended abdomen.

The operation was begun at sundown and completed by artificial light. The case was completely healed in three weeks. The cow did not miss a feed and nursed two calves through the entire season. The wound at no time was infested with screw worms.

* Presented at the Annual Meeting of the Iowa Veterinary Medical Association, Jan. 14-17, 1929



Top—Morning after operation. Center—One week after operation. Lower—Two weeks after operation.

October 25th I was called to case at 9:30 P. M. Angus milk cow, in barn with rumen greatly distended, with resultant rapid heart action and short, labored breathing. History—That morning the cow was found over the fence in with stock hogs and had eaten liberally for some time of the following mixture:

Ground oats and corn equal parts.

Soy beans and cottonseed meal.

The operation began at 10:30 P. M. and we were all washed up by midnight. The cow did not miss a feed or a milking. The illustrations show the progress of the case.

We prefer casting and tying of our patients. If they cannot stand the tying, the operation at best is merely postponing the funeral. We are content to just clip the hair from the operative area. We consider shaving a minor essential, and usually the condition of the patient will not permit the necessary expenditure of time.

We want two rows of sutures enclosing the wound in the rumen, with the first row completely buried by the second. We like to have plenty of round edge inverted.

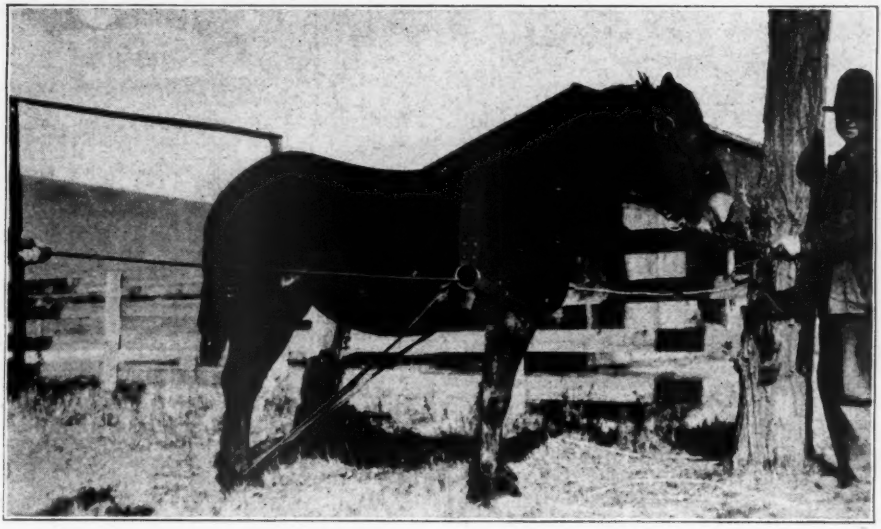
We feel our prognosis is all dependent on just two things more than anything else. *First* on liberal inverted edge and completely sealing this wound in the rumen. *Secondly,* on preventing food entering the peritonal cavity from the time of incising its wall, during the removal of the mass, and suturing, until it is healed.

CONTAMINATED MILK CAUSES ILLNESS

A brief but alarming outbreak of severe nausea and vomiting developed among children in two schools in Leeds, England, following the consumption of raw milk bought from a local dealer. The epidemic involved 83 children, all under 10 years of age. No fatalities were reported. The illness lasted from 2 to 9 hours while the attacks began in from 2½ to 5 hours after drinking the milk.

No specific organism was incriminated. The milk, however, carried 23 million bacteria per cc and colon bacilli were present. The latter were marked by a bacterium, probably of the coliform group, which was the predominant microorganism present in the milk.

The illness was attributed directly to the milk which subsequent investigations showed was probably contaminated on the producing farm.—*Illinois Health Messenger.*



SIMPLE METHOD OF CASTING HORSES

The illustration shows a very simply constructed casting harness which the writer has used for nearly twenty years.

The strongly made halter is one of the most important factors in throwing a wild colt or horse without any danger to the operators.

With the aid of an experienced helper, who is an old buckaroo, we have lassooed a colt, which had never had a halter on it and was as wild as a bottle of home brew, adjusted the harness, halter, tied Mr. Colt to a tree, cast it, operated on it, and had it out in the pasture inside of eight minutes.

With the halter and an inch manila rope tied around a tree or post, when the side lines are drawn up, Mr. Colt backs as far as he can, then loses his balance, and is dropped on his left side. The halter rope, tightly drawn, holds his head out straight, so that he cannot "hump" his neck, and try to take up his bed and walk, as he does when a man is trying to hold his head with main strength and profanity.

A double half-hitch is made of the lower rope to the upper ring, so that each leg pulls against the other. In other words, the harder the brute struggles, the tighter he is held.

The side lines are two twenty-foot lariats, and, strange to say, there is no danger of burning the fetlocks because there is no loose rope to stretch.

We usually apply a twitch to the nose as it seems to keep down shock.

Two men can handle the most vicious colt in this manner, and we usually allow the lariat to stay around the neck in case we have to use a lasso. After a horse has pulled against this once or twice it seems to act as a mental narcotic and cools his ardor down somewhat.

In handling and casting horses, take no chances. The quicker the animal is cast, made helpless and operated on, the better for everyone. Accidents happen when a horse is not completely restrained, or something breaks. We put in new sidelines every year or so, and have a new halter rope spliced on the halter every year.—B.

The Mayan Indians who lived in Central America over 1,000 years ago, knew something about dentistry for two teeth containing fillings with iron pyrites were recently found in a burial chamber in the ruins of the Mayan city Tzimin Cax. *Science.*

Johne's Disease

By B. A. BEACH, Madison, Wisconsin

AS EARLY as 1881 a peculiar thickening and corrugation of the intestinal mucosa in some cases of chronic diarrhea of cattle was observed. The specific organism was not seen microscopically, however, until 1905 by Johne and Frothingham, who considered the disease one form of tuberculosis. This malady was first discovered in this country in 1908 by the late Dr. Leonard Pearson. Real progress in the study of Johne's disease was not made, however, until Twort and Ingraham of England were able to grow the specific organism in the year 1910.

Characteristics

Johne's disease is a specific chronic enteritis of cattle caused by a member of the myobacteria or acid fasts; the same group to which the cause of tuberculosis belongs. Microscopic examination of the affected mucosa usually reveals these organisms in large numbers. The organism grows in the intestinal wall and in the mesenteric lymph nodes. A diffuse thickening of the intestinal mucosa is produced which interferes with absorption. The disease is marked by emaciation and intermittent diarrhea.

Primarily a cattle disease, it is also found in sheep. One case has been reported in deer.

Distribution and Prevalence

European countries, notably England, Holland, and Switzerland, have harbored the disease for a long time. It is also prevalent in this country, having been reported from about one-half of the states.

Definite statements concerning its prevalence cannot be made. There is at present only a limited number of sources in this country from which Johne's disease can spread. The infection is largely confined to purebred herds, especially of the Channel Island breeds. These sources of infection will continually increase unless commerce in cattle from these herds is stopped. V. A. Moore (1924) has compared the present situation of Johne's disease to that of bovine tuberculosis sixty years ago, and has predicted that if not controlled it may become a more troublesome scourge for future generations than tuberculosis is for the present generation of cattle owners. If steps are taken to control Johne's disease, there is no need for undue alarm. It probably spreads less rapidly than does tuberculosis and it usually takes this disease many years to become very prevalent. Johne's disease seems to exemplify a condition to which the old adage "a stitch in time saves nine" may be applied.

Symptoms

The incubation period is greatly extended in some cases. Observations made in England indicate that at least six months must elapse after invasion before symptoms become evident. This implies that the disease is seldom seen in real young animals, a fact borne out by observations in the field. The lack of symptoms, however, does not mean that young animals are not infected. Ernest (1927) tested a herd of 207 animals with Johnin; nearly one-half of them responded to the test. Among these reactors were 17 calves ranging from three weeks to six months of age. It is known that animals may harbor the infection for years and yet show no symptoms of the disease. A six-year-old cow developed Johne's disease. At six months of age this animal had been purchased from a herd in which the disease was known to exist. As far as could be determined, this was the only contact with Johne's disease this animal had ever had.

There is in Johne's disease, as in tuberculosis, a tendency to rapid progress in some animals which have not previously shown symptoms. Such decline frequently follows parturition. Heifers with their first or second calf are more apt to show these more acute symptoms.

Animals may be affected for a number of years before symptoms are shown. One instance that came under the writer's observation is as follows: A cow reacted to the

Johnin test in 1918. In 1921 this herd was again tested and the animal reacted for the second time. The following year another reaction was observed in this animal when the herd was sold for slaughter. O. Bang (1914) followed the history of 54 animals which had reacted to avian tuberculin. Five years later eleven such animals were still apparently in perfect health.

Johne's disease is probably one of the most chronic of all those caused by bacteria. An animal may show unmistakable symptoms of the disease and remain alive for a number of years, exhibiting neither marked improvement nor decline. One animal under our observation in April 1925 showed what were then considered symptoms of a rather advanced case of this disease. There was little change during the subsequent two and one-half years. Positive reactions to Johnin were obtained a number of times during the period. The animal died in November 1927. Typical lesions were found and acid-fast organisms were demonstrated in the tissues.

The most striking symptom is a gradual loss of flesh. This may continue until the animal becomes almost a skeleton. The eyes remain bright but become sunken. Usually there is no elevation of the temperature and the appetite remains good. An intermittent diarrhea may or may not be present. Emaciation and diarrhea should arouse suspicion. Because of the exceedingly slow development of the disease, its serious condition may be overlooked. This lack of recognition frequently gives opportunity for widespread infection of the herd.

Changes Produced in the Tissues

The characteristic lesion occurs in the intestine, the wall of which is thickened over a greater or smaller area. Cases are reported of a thickening of the entire intestinal tract. The most constant site is the region of the ileo-cecal juncture. At times the valve is greatly swollen 15 to 20 times its normal size. A piece of thickened intestine presents at its mucous surface a peculiar wrinkled appearance. The mucosa is thrown into folds and ridges. Normal intestinal wall at times presents folds; these, however, will disappear on stretching. It is not uncommon for a piece of normal intestine to be interposed between two thickened pieces. This patchy tendency is frequently seen in involvement of the cecum. There is no characteristic color. At times intense inflammation is seen in the region of the ileo-cecal valve. One of the striking characteristics of Johne's disease is the slight tissue change compared with emaciation of the animal. The mesenteric lymph glands are frequently somewhat enlarged and softened. Tissue changes outside of the intestine and adjacent lymph glands are rare.

Johnin as a Diagnostic Agent

The use of Johnin as a name for the product made in a manner similar to tuberculin was suggested by McFaydean (1914). This product is sometimes called para-tuberculin. Our field experience has been wholly with intravenous injections. Some investigators claim good results with intradermal and subcutaneous injections. The two latter methods are not in general use at the present time. It seems probable, however, that both will in time be developed to a point where they are practical. The dose for intravenous injection varies with the product (5 to 15 cc). At least one pre-injection temperature should be taken. Should animals be found which show an elevation of temperature without apparent reason, the herd should not be tested at that time. The practice of eliminating those animals showing the temperature and testing the remainder of the herd should not be followed. As will be seen by Table I, approximately 80% of the highest temperatures occur between the fifth and eighth hours after injection. At times there is considerable variation in the time when the temperatures are highest.

Hour After Injection	Number Reacted	Per Cent	Hour After Injection	Number Reacted	Per Cent
1	None	None	7	18	22.7
2	None	None	8	4	5.5
3	8	10.12	9	1	1.16
4	5	6.32	10	3	3.70
5	34	43.	11	1	1.16
6	5	6.32	12	None	None

The success or failure of this test is determined largely by the expertness of the operator in being able to deposit the Johnin into the blood stream.

EQUINE DENTISTRY

Recently we had occasion to go over the teeth of nearly one hundred head pack mules and horses for the forest service.

By using the greatest of gentleness, speculums on only a few, we were able to get by without any of the animals attempting to cut their teeth on our fingers or thumbs.

As a usual thing, old horses owned by rather aged people are the worst to handle. They are used to having their own way in every thing, and the best method is to send the owner in for a pan of water, and then twitch the brute real good and tight, get him in a corner, and

Filing a remonstrance

have the work nearly done by the time the owner gets back.

We first examine the mouth with a flash light, looking for wolf teeth, long molars, supernumerary incisors, and enamel points.

We have observed a lot of equine dental work being done, and we really think too much exercise is indulged in by the average operator.

The owner appreciates his animal being handled easily, the teeth properly floated, and any other work without causing a lot of hemorrhage around the gums.

For long molars, the double-action open cutters will make a clean, straight operation. Every once in a while one runs across an abnormal molar, usually the first. This is as hard as flint, and often as large as an egg. Unless you have the best of instruments, don't begin on it, or you will "bust" more good cutters or extractors than the animal is worth.

Trephining is a good job for a hospital. The after attention is what causes the grief. After an owner has squirted in deodorants, antiseptics, germicides, disinfectants, or what have you, for about six weeks, he will look at you with a seasick expression.

We advise our clients to have the teeth of horses fixed in the fall of the year. We also give them a good tonic to put on the feed. It is remarkable how a very thin horse will regain his girlish form if the medicine is placed carefully on a *gallon of oats* at least twice daily. In a couple of months the proud owner exhibits his noble charger and says: "Doc done that." And Doc, modest as a violet, accepts the praise in due and ancient form.—B.

Destroying a Glandered Army Horse

Since the war, glanders has been a very rare disease among horses. In fact, practitioners with a very general equine territory report no cases for some years. The generous and widespread use of the ophthalmic mallein test has seemingly cleared up the once prevalent disease.

By remarkably good timing the photographer has caught this horse just as he "crumpled." For certainty, despatch and humane reasons nothing else quite equals a well directed bullet from a "forty-five" when it comes to destroying a horse.

Do you remember the old "horse doctor" of thirty years or more ago, particularly in the backwoods districts of the rural sections?

The best mare became sick, and Pa, with the aid of much perspiration and physical efforts, poured down a bottle of homemade colic medicine. This was usually "yarbs," raw linseed oil, and whatever happened to be at hand. Usually, they were out of everything when needed.

Telephones were unheard of, so one of the boys was dispatched on horseback to "git Doc" as quick as he could. "Doc" was self-educated, and took great pride in his job. He was not always the drunken sot he has been pictured by writers who think it smart to make fun of anything in the olden days. He was often a farmer who had "sech good luck doctorin' stock" the neighbors kept him busy, and he gradually drifted into the work because he liked it.

In those days, the loss of a horse or cow meant a lot to the average owner. It took five years of care to raise a horse, and a cow was often part of the "living."

The "vet" in those days had to plow through muddy roads, snowdrifts, and even follow trails horseback. His instruments were few; his medicines even fewer, but he had a good supply of horse sense, which, like charity, covers a multitude of sins.

Cows with milk fever died; "blood pizen" was usually fatal; but how our expert could shine "treatin' dry murrain, stomach staggers and loss of cud." Lung fever in horses was almost as far reaching as colic, and our equine specialist had the worried owner giving copious drenches, applying bags of heated salt or oats, and 'lotsa rubbin'." Aconite, belladonna, niter, whisky, or what have you, were standard remedies.

There were, of course, many unscrupulous quacks, whose ignorance, cruelty and dishonesty were bywords. They were drunkards and gamblers, without the least ideas of morality. They were usually associated with race hosses, livery stables and any kind of a low dive. However, the writer's earliest recollection of a country doctor, a dentist and a veterinarian of thirty years ago are of the pleasant sort. Our physician was a doctor of the old school, kindly, experienced, and a father confessor to us all. He was fairly well fixed, an elder in the Presbyterian church, and whose word was as good as his bond. Our dentist was a fine old fellow of a good mechanical turn of mind. When he filled a tooth it stayed filled. He charged fifty cents for pulling a tooth; two dollars for gold fillings, five dollars for a good crown, and twenty dollars for a plate, or thirty-five for a complete set. Our veterinarian was a fine old fellow who owned two farms, and who had been a very successful live stock raiser. His horses, cattle and hogs always took first premium at the county fair. He believed in many of the theories that experiment colleges are now

publishing as absolutely new. He was an exponent of fresh air, sunlight, exercise, limestone, whole oats, and keeping an animal as near nature as possible. He had good success with his own sick animals, whenever he had one, and gradually came to be called to see the neighbors' stock. He had a large territory, and was as successful in his practice, according to the standards of the time, as many of the present-day graduates. He was considered one of the most indispensable of men in the whole country, and when "Doc" got sick, and finally died, there was genuine mourning in the whole neighborhood.

A curious thing occurred when his son attempted to take over the practice. He was not fitted for the part, being more interested in "fiddlin' " and dancing. He was a fine musician, and the very odor of animals nauseated him. His practice grew less and less, and when the autos began to come in, he was doing very little work and glad of it. Having inherited a farm from his father which was underlaid with coal, oil and gas, he was not compelled to work unless he wanted to.

The old-time veterinarians, therefore, performed a wonderful service in their limited way.

We contrast the present with the days of thirty years ago. We get a bellyache, and our family physician calls in a surgeon. The latter recommends an immediate operation. Our dentist finds a small cavity in one tooth and immediately suggests that all our teeth should be extracted right now, as it may be causing goose-pimples and freckles. We are X-rayed, given the metabolism tests, the Wasserman, dieted, and when we get back we have to borrow money from the bank to pay our taxes. Instead of kindness and sympathy, we are handled in a clinic as Armour or Swift handle swine. No longer patients, we have become "cases" designated by numbers of three or four figures.

In our present-day era of efficiency, scientific attainment and rapid transportation I wonder if we are not overlooking the greatest thing of all—the Golden Rule.

To the old-time horse doctor, and the family doctor of the pioneers, who "done his damndest—angels could do no more," we lay a wreath of memory's blossoms and wish him well on the evergreen shores of the hereafter.—B.

"Hey, hey," knickered the mules, as they saw the army veterinarians grading hay.

A bale of hay can contain a botanical museum, and the practitioner is often puzzled to determine just what caused disease and death among his client's live stock.

In the west, oat hay is very commonly fed, and in warm, moist winters is apt to mould, with a resulting botulism or something, to be on the safe side, say "forage poisoning."

If the veterinary student were given practical demonstrations in recognition of poisonous plants, and of useful and useless forage plants, it would do them a lot more good in after life than spending time drawing little stamens and pistils and memorizing a flock of botanical names that are forgotten as soon as examinations are passed.

Grading hay is a good exercise for anyone engaged in animal husbandry, dairying or veterinary science. The army veterinary service is way ahead of our veterinary colleges in teaching each veterinary officer to become a qualified grader of hay.

Reviews and Abstracts

Recent Theories of Parturient Paresis

Professor Harding[1] reviews at some length the history and general symptomatology of milk fever, and following that goes into great detail in discussing the hypoglycemia theory, which although he believes to be incorrect and fails to account for the known facts concerning the disease and their evident effect, he appears to take very seriously.

The hypocalcemia theory of Greig and the hypophosphatemia theory of Fish are discussed in less detail but Harding also finds that they in some respects fail to satisfy conditions, and advances a dehydration or rather a anhydremia theory that in his opinion accounts for all of the phenomena of milk fever, the anhydremia being due of course, to the large abstraction of water from the blood for the production of colostrum and milk.

Professor Harding's article is not based on personal observation or investigation, but upon an examination of the literature on the subject and its comparison with personal observation and investigation of similar conditions in the human. In his search of veterinary literature on this subject, we think he has gone astray in some respects. First, in thinking that the veterinary profession of the United States takes the hypoglycemia theory seriously or has extensively used it. Again, he draws the conclusion that milk fever does not recur after recovery during the same lactation period, and furthermore that it is very rare except 12 to 48 hours after calving; also that no cases are introduced with spasms, tetany or excitement.

As between the hypoglycemia theory of the cause of milk fever and the hypocalcemia theory, the author obviously favors the former as coming nearer to meeting the requirements of a sound theory. He appears to ignore the reports of the treatment of cases based upon these theories, which from the literature may be summarized as follows.

The intravenous injection of glucose in parturient paresis gives excellent results when the udder is also inflated, which is just about equivalent to saying it does no harm.

Quoting Fish[2] on the treatment based on the hypocalcemia theory, we have:

"Very remarkable cures are claimed by the use of calcium chlorid solutions injected intravenously. A 10% solution of crystallized calcium chlorid to the extent of 300cc to 400cc, slowly injected, is recommended for treatment. At times, the addition of one or two milligrams of adrenalin, or atropin, or sixty grams of glucose to the solution is also recommended. Recovery occurred without other forms of treatment and in a number of cases the calcium chlorid treatment was used when inflation of the udder failed to help and in other instances when the patients were in an apparently hopeless condition. Occasionally there were relapses and a second injection was necessary to secure recovery."

Bovine Abortus Organism Causes Abortion in Swine

In March 1927 an outbreak of infectious[3] abortion occurred among some pigs which had not been fed with cow's milk, but had received garbage which had not been heated. The yards of the premises were infested with rats. There had been no previous record of abortion in the herd. No fresh pigs had been introduced for a year except a boar which came from a free herd.

From fetuses of three out of four sows cultures resembling *Br. abortus* were ob-

[1] Harding, Victor John; A Review of Some Recent Theories of Milk Fever; Reprinted from Transactions of the Royal Canadian Institute, Vol. XVII, Part 11, 1930; University of Toronto Press.

[2] Fish, Pierre A.; Recent Progress in our Knowledge of Milk Fever; presented at the 66th annual meeting of the American Veterinary Medical Association, Detroit, 1929; A. V. M. A., Vol 28, No. 6, (December 1929).

[3] Smith (T.). A Strain of *Bacillus abortus* from Swine.—*Jl. Experim. Med.* 1929. Apr. 1. Vol. 49. pp. 671-679.

tained. The bacillus was readily recoverable from the heart blood and internal organs of the fetuses. So far as was ascertained the three strains isolated were identical. All grew well in unsealed tubes, and sealing the tubes appeared to retard growth.

In inoculated guinea pigs necrotic suppurating foci appeared in the spleen and lymphatic glands. Agglutination tests comprising cross agglutination and absorption procedures failed to distinguish the strain from the bovine type of organism. Although necrotic and suppurating lesions were produced in guinea pigs, the lesions were not nearly so extensive as those previously reported as being caused by a strain of porcine origin. A culture fed to a sow in an advanced stage of pregnancy failed to produce abortion, possibly because of the advanced stage. The organism was not recovered from the uterus, but was found in the sow's milk.

Vaccination Against Rabies

Protective inoculation of dogs against rabies[4] has to a great extent established its value, and the service which the prophylaxis may render appears to be beyond doubt.

It is obligatory in Japan, Cuba, Portugal, and in certain large towns in Italy and California. It has been widely applied in the United States. France, the cradle of antirabic vaccination, will soon be one of the few countries where advantage has not been taken of the benefits that vaccination confers. It cannot be denied that the sanitary police measures are unsatisfactory. Apart from official inertia the failure to put the regulations into force is due to the fact that slaughter of dogs bitten and all in contact is the principel safeguard. There is always a tendency for persons to try to save their animals, and the severity with which the law is enforced varies from place to place and from time to time. The author does not think it would be possible to modify the procedure in any way without actual alteration of the law, because it would involve a complete change in the point of view of the majority of the people. Vaccination could render valuable aid in the control of the disease.

The original method of Pasteur is not applicable because of the number of injections required, and because the vaccine cannot be sent great distances.

During recent years investigation has led to the production of at least three forms of vaccine: the glycerin-carbolized vaccine of Japan, Remlinger's ether virus, and the author's formolized vaccine. The first two of these employ an attenuated vaccine. In Plantureux's method the virus is killed by 4 per 1,000 formalin, and therefore there is no risk of causing the disease. Further, the vaccine is freed from the soluble toxic substances of the rabic brain tissue and consequently it is absolutely harmless, and it would appear that there is no reason to fear the development of paralytic symptoms.

The author has given 100-150 cc. of vaccine at a single dose to rabbits without producing the slightest ill-effect. The dose for a dog of medium size is 20 cc. Four sheep were inoculated every three weeks for a year with 200-300 cc. without any disturbance of health. Between each inoculation 800 cc. of blood were withdrawn for the preparation of anti-rabic serum. In all, apart from rabbits, about 300 animals (dogs, goats, sheep) have had the vaccine injected either before or after infection, and in no instance has there been any disturbance of health.

In actual practice 500 dogs have been vaccinated. An important point in connection with the formolized vaccine is that it is stable. At room temperature it retains its entire properties for three months or more, and in an ice chest (+ 10° C.) it is quite fully serviceable up to 8 months or more. The vaccine can be used for the inoculation of herbivora after they have been bitten.

Two inoculations are necessary and it is recommended that as long an interval as possible—3 weeks—be left between the injections.

On account of the facts elicited by Ramon

[4] PLANTUREUX (E.). Sur la vaccination préventive des chiens et la prophylaxie de la rage. [Protective Inoculation of Dogs, and Prophylaxis against Rabies.] *Rév. Vét. et Jl. Méd. Vét.* 1929. Aug. Vol. 81. pp. 409-419.

in his work on anatoxins it was thought possible that after vaccination another injection at the end of a year would result in the establishment of a solid immunity. Experiment has shown this to be the case. The animals resisted intra-ocular inoculation with street virus.—*Trop. Vet. Bul.*

Achievements of the Veterinary Profession

At the recent state meeting of the Wisconsin Veterinary Medical Association, State Commissioner of Agriculture spoke in the most appreciative terms of the services that the veterinarians of the state have rendered its people, emphasizing particularly their work in the control and eradication of bovine tuberculosis, estimating that within three weeks, all the cattle in the state of Wisconsin would have been tested once, and that within two years, the entire state will be a modified accredited area.

Similar tributes to the services that veterinarians are rendering the live stock industry are not uncommon from those high in the councils of agriculture, and not infrequently hog cholera, tick fever, contagious abortion and foot and mouth disease are cited as examples of diseases in the control of which the veterinary profession has rendered conspicuous service.

But other than in the last named disease, few if any live stock men give any consideration or thought to the losses that are saved from other diseases that exact a heavy toll in other countries, but are unknown in this one, and for which our live stock industry owes its immunity from loss to achievements of the veterinary profession in the past and its vigilance at the present time.

A recent article by Henry,[5] describing conditions in Australia, is illustrative of this. Concerning contagious pleuro-pneumonia, he makes the following statement:

"Lung sickness (pleuro-pneumonia contagiosa) has long ranked as one of the three great cattle plagues of the world. The other two are foot and mouth disease and rinderpest. For the past seventy years Australia has had the unhappy experience of suffering all the disabilities which the presence of the first-named disease inflicts on a great cattle-raising country."

It will be noted that of the three great animal plagues two have been eradicated from this country by the veterinary profession and the introduction of the third, despite plentiful opportunity, has been prevented by its vigilance.

In the same issue of the Australian Veterinary Journal, the editor speaks of the indirect loss from contagious pleuro-pneumonia as being perhaps greater than the direct loss involved in the death and slaughter of infected animals and mentions that the presence of the disease in Australia has led to the absolute ban on the export of cattle to New Zealand, the Dutch East Indies and the United States, and even the export of sheep to the latter country.

Contagious pleuro-pneumonia was introduced into Australia in 1858. It was recognized by a veterinarian while yet confined to a single herd and the destruction of the whole herd advised. The advice was ignored and a Royal Commission appointed to inquire into the disease and the circumstances of its introduction. While the Commission was in session, the disease got away and ultimately spread to every state in the commonwealth. As early as 1861 attempts at eradication were made and the records show that in that year the government bought some 6,000 to 7,000 head of cattle and destroyed them.

The same procedure has been followed more or less intermittently for nearly three-quarters of a century. To quote the author:

"Immediately on the discovery or notification of the disease, quarantine is imposed on the cattle concerned. By interstate agreement the minimum period of quarantine in the case of an outbreak is

[5]Henry, Max; The Problem of Pleuro-Pneumonia Contagiosa in Australia; The Australian Veterinary Journal, Vo. IV, No. 3 (September 1928).

laid down as sixty days from the date of the last death or successful inoculation which ever happens to be the latest.

"In all states the slaughter of affected cattle is carried out to some extent, but the thoroughness with which this policy is pursued unfortunately varies considerably. . . .

"Tolson, speaking to the members of a stock conference in 1889, said: 'It is generally considered that an animal once having had the disease, becomes a center from which infection may at any time be spread.' Although the truth was thus recognized, it was not until within comparatively recent years that the policy of slaughter of all affected animals was made in any way effective.

"Under Australian conditions satisfactory control is impossible unless steps are taken to prevent any animal from recovering from pleuro-pneumonia. This can only be insured by frequent inspection. In no part of Australia is the policy of immediate slaughter of in-contact cattle carried out, simply because in no State is eradication in the immediate future looked for."

From the foregoing it will be seen that measures for combating contagious pleuro-pneumonia in Australia are not under the direction of veterinary officials, and it will also be deduced that the disease in Australia will continue to take its enormous toll until its control and eradication is placed completely in the hands of veterinary officials.

The eradication of the disease from this country and the repeated eradication of foot and mouth disease shows what may be expected when the work is placed in the hands of the veterinary profession. The $50,000,000 a year that hog cholera still costs us and the presence of rabies shows what may be expected when the measures, although carried out by veterinarians, are under the direction of laymen.

Rabbits and Sheep Raising

Vast areas in Western Australia too arid for farming, are better adapted to sheep raising than to other forms of live stock industry, but there are certain drawbacks to that. Among these, one of the most important is the rabbit.

If the rabbits are not reduced in numbers through poisoning, they speedily multiply to a point where they eat up the sparse vegetation and the sheep starve to death. If the rabbits are poisoned the chances seem about one in two that the sheep will eat the poison and die months later from phosphorus poisoning. If the sheep do not eat the poison, the rabbits eat it, and since the vegetation is low in phosphorus, the sheep, continually suffering from a mild phosphorus deficiency, eat the bones in the rotting carcasses of the poisoned rabbits and die of a parabotulinus intoxication similar to styfseitke of South Africa and loin disease of Texas.

Bull[6] reports an interesting investigation of phosphorus poisoning in sheep due to eating rabbit bait. The most striking thing about the condition being the long period that elapsed between the consuming of the poison and the first symptoms of poisoning that were shown. Doctor Bull summarizes his report thus:

"An outbreak of phosphorus poisoning in a lot of five hundred merino ewes is described. This was the result of the sheep picking up poison baits laid for the destruction of rabbits in a paddock which had been 'eaten out' by the sheep. The main losses occurred approximately from six to twelve months after the baits were laid. Approximately 25 per cent of the animals died or developed a chronic cachexia. The main lesion found was an atrophic cirrhosis of the liver."

[6]Bull, L. B.; Phosphorus Poisoning in Sheep; The Australian Veterinary Journal; Vol. IV, No. 3 (September 1928).